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BRIEFLY TOLD.

OBITUARY NOTE.—MR. THOMAS G. RUSSELL.—A long, active and useful career was terminated when death claimed Mr. Thomas G. Russell, of St. Louis, Mo., whose demise occurred, while on a visit to his daughter, Mrs. Crenshaw, of Springfield, Mo., the afternoon of May 26. Since the death of his wife, which occurred February 16th, 1901, Mr. Russell had been very much depressed and enfeebled, and the cause of his death was a slight attack of indigestion which he was unable to overcome through weakness and age. Deceased was born in Georgetown, D. C., April 7th, 1823, and gained his education and passed his early manhood in Washington, D. C. In 1849 he removed to St. Louis and engaged in the wholesale grocery trade, in which venture he was quite successful. In 1864, in connection with Mr. C. S. Russell and Mr. George W. Parker, he established the firm of Parker Russell Company, for the manufacture of retorts, firebrick and other fireclay goods. On the incorporation of the Parker-Russell Mining and Manufacturing Company, in 1866, he was elected its Treasurer, a position which he held to the end. He was an associate member of the Western Gas Association, having been elected as such in 1878. He was a man of much method, and success marked all of his undertakings, and his personality and ways were such as to make and hold for him the friendship of those with whom he came in contact. The funeral services were held in St. Louis, the afternoon of May 28th.

THE WRINKLES AT THE MEETING OF THE WESTERN GAS ASSOCIATION.—Our current chapters of the proceedings of the last meeting of the Western Gas Association contain the collection of "Wrinkles" made by the Association's clever and capable Editor, Mr. F. H. Shelton. Indeed it might be said that he was both author and editor, for of the 18 items presented, no less than 13 emanated from himself. However, taken altogether, the wrinkles were of the useful and available sort, and there can be no doubt that many of them will be availed of hereafter in practical way. The resignation of Mr. Shelton from the editorship was regrettable, but the plain fact is that his duties nowadays are so many and pressing that his retention of the post was altogether out of the question. His successor, however (Mr. W. E. Steinwedell, of Belleville, Ills.), is a capable, energetic and observing gentleman, and if the members will see to it that through themselves he gets suitable assistance, there need be no fear that the Western's Wrinkle Department will lose anything in interest or effectiveness.

MR. GIMPER'S "STORMY EXPERIENCE."—Another chapter of the proceedings details some of the terrible happenings experienced by Mr. John Gimper and the Galveston Gas Company, whose engineering management he so capably directs, during the frightful conflict of the elements in and around that city last September. Of course, it would be simply impossible to put down on paper anything like an adequate or realistic portrayal of the horrors of that storm, the magnitude and fearful results of which were sufficient to shock the world; but Mr. Gimper's plain narrative of its effect upon the Galveston plant is sufficient to show how greatly it suffered. But the story also has another side, in that also shows how grit and determination can

JUN 3 1901
SMITHSONIAN DEPOSIT.

overcome obstacles which at the first blush look unconquerable. To have restored the system to the point of being able to send out gas again in virtually 18 working days is simply marvellous, under all the conditions, as detailed by Mr. Gimper. All credit to him and to his associates for their courage and activity, and may the measure of their future success be of the greatest.

THE COMING MEETING OF THE GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.—A correspondent in Berlin informs us that the 41st annual meeting of the German Association of Gas and Water Engineers will be held in Vienna, Austria, the 17th, 18th and 19th days of this month. The sessions will be held in the concert hall of the Musical Society, No. 1 Dumba Gasse, from 9 A.M. to 2 P.M. daily. Among the papers that are to be read that will be of interest to gas men are: "Danger to Street Mains through Electrolysis," "The Building of the Gas Works of the Municipality of Vienna," "Starting the Vienna Municipal Works," "Concerning the Gas Tariff Question," "Rapid Gas Measuring and Analysis." Dr. Carl Auer von Welsbach will give a lecture before the Association, but his subject has not been named. Reports are to be handed in by committees that have been considering the following matters: "Photometry," "Gas Heating," "Normal Proportions for Gas Meters," and from the "Educational Committee." The programme also provides for an inspection of the municipal gas works (built in 1898, and equipped with 1,620 inclined retorts), and a visit to the modern electric lighting plant, that is being constructed by the municipality, and which is well along towards completion.

NOTES.—The proprietors of the Santa Barbara (Cal.) Gas Company have decided to install additional generating plant in their works, and to that end have contracted for the necessary water gas apparatus with the Western Gas Construction Company, of Fort Wayne, Ind.——Another contract recently secured by the Western Gas Construction Company is that for a complete specimen of its improved condensing plant, to be constructed on the works owned by the American Gas Company, at Kingston, N. Y.——The Gloucester (Mass.) Gas Light Company has purchased the Tibbetts' property on Main street and will occupy the same as an office and salesroom. Eventually the Company proposes to reconstruct the building.——The Maryland Improved Gas Company has been incorporated in Baltimore, by Messrs. Robt. E. L. Griffith, Charles C. Hughes, Harvey M. Cash, Samuel W. Regester and Edwin Hewes. It is organized for the purpose of "dealing in gas and gas appliance inventions." It is capitalized in $60,000.——The following is the bid submitted by Mr. John A. Britton, on behalf of the Oakland (Cal.) Gas Light and Heat Company, for the public lighting of that city: "For street lights, 3¾ cents per lamp per hour, and for the lighting of public buildings, for each arc lamp of 2,000-candle power (commercially rated) at and for the price of $7.70 per lamp per month, or at the rate of 3¾ cents per lamp per hour; the number of hours that each lamp is to burn when used in public buildings at the rate of $7.70 per month not to exceed 1,500 hours per annum, and for incandescent lamps for public buildings by meter measurements, at the rate of 10 cents per 1,000 watts, subject to the following discounts: For a consumption of over 200,000 watts per month and under 400,000 at 20 per cent., and for a consumption of over 400,000 and under 600,000 40 per cent., and for a consumption of over 600,000 watts, 50 per cent., the above amount to be based upon the total registration of all current used by the city of Oakland during any one month, and for gas for public buildings, at the rate of $1 per 1,000 cubic feet by meter registration."——Mr. Henry L. Doherty, of the Denver (Col.) Gas and Electric Company, has been elected President of the National Electric Light Association.——The Battle Creek (Mich.) Gas Company is to have a handsome, new office building, to be located on the corner of Main and Monroe streets.——The Massachusetts Board of Gas and Electric Light Commissioners has issued an order, respecting the petition of the Mayor of Waltham, Mass., for a reduction in the price of gas and electricity charged by the Waltham Gas Light Company. The recommendations are: First. That the net price for gas sold by the Company after June 1 next shall not exceed $1.35 per 1,000 feet. Second. That the net price for commercial arc lights, operated substantially as heretofore, burning 6 nights per week, shall not exceed $9 per light per month, and burning 4 nights per week shall not exceed $7 per month. Third. That the net price for the supply of commercial incandescent lamps shall not exceed 18 cents per kilowatt hour.——The Kennebunkport Light and Power Company, to supply gas or electricity, or both, in the towns of Kennebunkport, Kennebunk and Wells, Me., has been incorporated.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.—CONTINUED FROM PAGE 807.]

PROCEEDINGS, TWENTY-FOURTH ANNUAL MEETING WESTERN GAS ASSOCIATION.

HELD IN THE GALT HOUSE, LOUISVILLE, KY., MAY 15, 16 AND 17, 1901.

FIRST DAY, WEDNESDAY, MAY 15th.—MORNING SESSION.

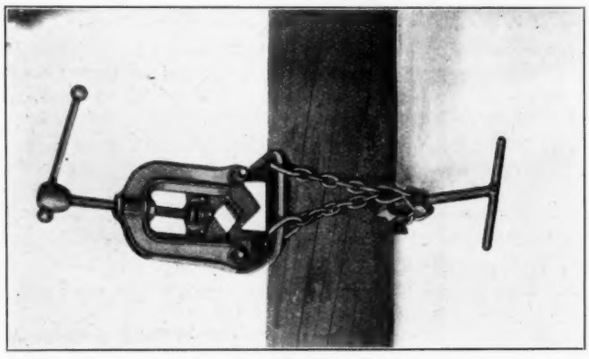
The President said it was thought best, in view of the fact that the election for officers would be postponed from the evening of the 15th to the morning of the 16th, to further change the order of the printed programme. That their time might be the better utilized he suggested the taking up of the

WRINKLE DEPARTMENT.

This was agreed to and Editor F. H. Shelton read his budget, as follows:

To the Members of the Western Gas Association: Gentlemen—The crop of "Wrinkles" this year has been surprisingly small, but six having been offered, and three of these in fact came from those who are not members of the Association. It is perhaps fortunate, therefore, that I am enabled to offer you, from my notes made last summer during a trip abroad, a dozen or more foreign "Wrinkles." Such, at any rate, may have the merit of variety, and afford a change from those usually locally collected. The collection is as follows:

No. 1. *Portable Street Vise.*—Mr. B. W. Perkins, of South Bend, Ind., forwards a photograph of a very handy way of setting up a vise for service work, etc., on the street, when a cart or tool wagon is not available. He simply clamps the vise on the nearest telegraph pole,



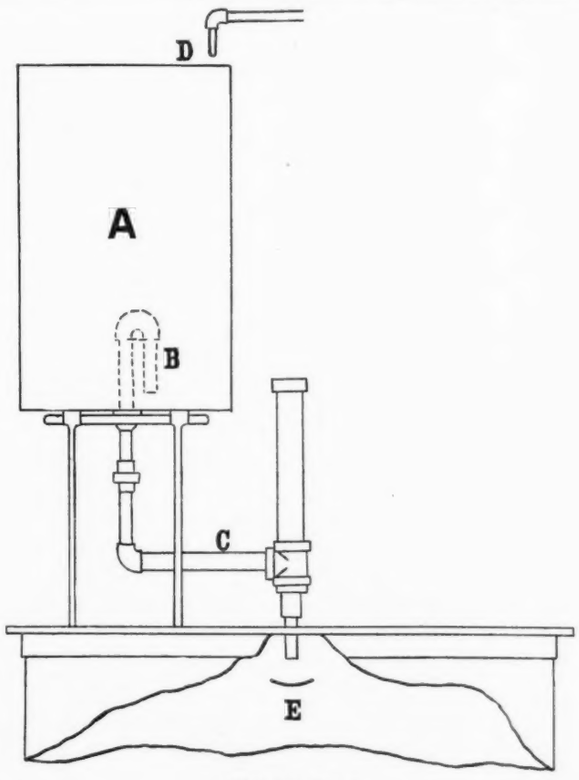
Wrinkle No. 1.

tree or post, with a chain and grabhook, in much the same way that a tapping machine is fastened to a main in a trench. The tightener is a T-handled screw that passes through a solid link with a swivel end. This link has 4 teeth on the base side, to keep it from turning.

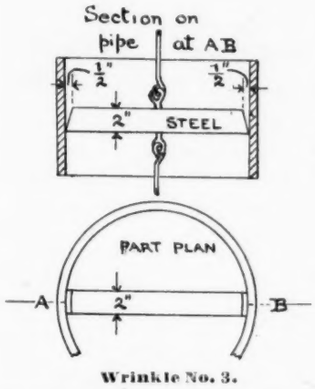
No. 2. *Intermittent Spray for Coal Gas Scrubbers.*—Mr. R. E. Slade, of Lockport, New York, kindly contributes a description of a water spray, used by him as follows: "The open top, 18-inch by 28 inch tank *A*, is of galvanized iron, and the siphon and seal pipes are made of ¾ inch and 1 inch ordinary pipe and fittings. The quantity of water running in at *D* can be seen at all times. The contrivance gives the advantage of an intermittent spray without moving parts. It is simple and the cost is small. Better distribution can be obtained by perforated pipes at *E*, inside the scrubber, than by the 3-inch saucer shown in the drawing. The water will rise about 15 inches above the return bend *B*, before flushing to overcome about 10 inches gas pressure on the scrubber and air trap that forms after a discharge."

No. 3. *Pipe Cleaner for Water Gas Machine.*—Mr. William E. McKay, of Boston, kindly contributes the following: "In the Lowe apparatus, when the outlet pipe becomes coated with carbon, the deposit is at times difficult to remove. If a bar of steel, about 2 inches by 2 inches, has the lower edge neatly sized and shaped to the circumference of the pipe, at each end, and has the upper edge at each end set back, so that the beveled ends make cutting tools, the carbon can be quickly and completely removed. A light wire or rod attached to the bar will afford control, and a heavy hammer or rod can be used to drive the tool down through the pipe."

No. 4. *Sight-Feed for Water Cooling Valves.*—Mr. McKay also offers the following as a very convenient and practical device in connection with the "hot valves" of water gas apparatus: "Where the



Wrinkle No. 2.



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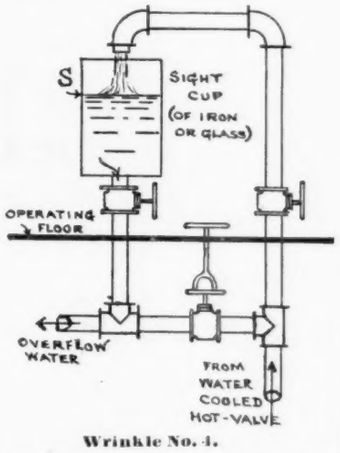
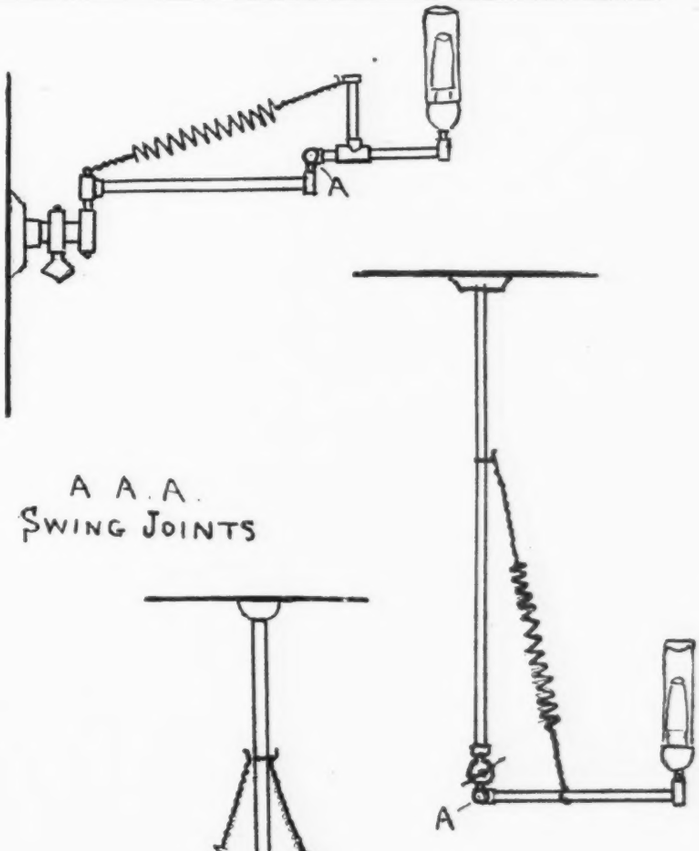


Wrinkle No. 4.

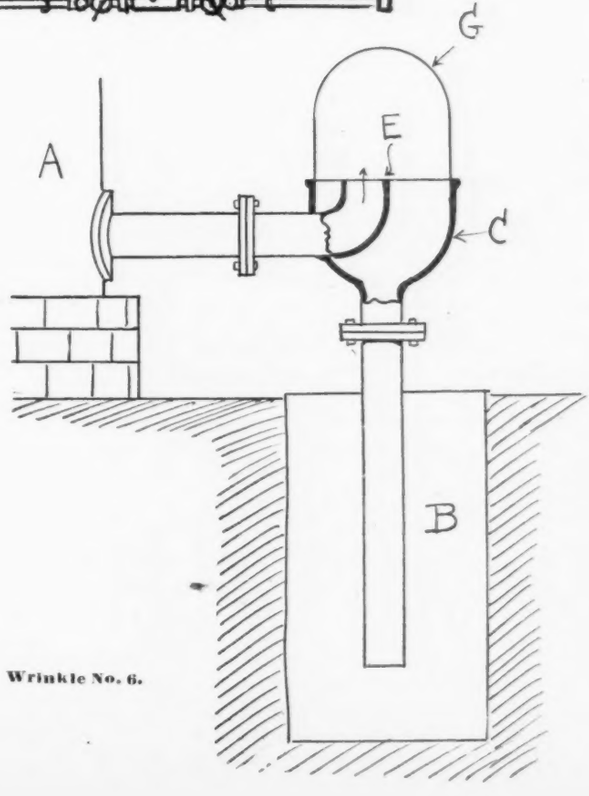
up-and-down steam is used with the Lowe apparatus, the upper valve between the generator and carburetter is most in need of water cooling. Instead of having the water, after leaving this hot valve, run below the operating floor, it can be brought above the floor, and, by using additional small valves, a few feet of pipe and a piece of iron pipe *S*, or a glass cylinder, it is equipped with a sight cup by which the amount of the water flowing from the hot valve can be closely regulated. The temperature can be easily taken and the amount of water so gauged as to prevent the injury of the valve by overheating."

No. 5. *Anti-Vibration Fixtures.*—Mr. Jamer Ferrier, of Columbus, Ga., suggests a handy way of making anti-vibration fixtures, in order to reduce the breakage of Welsbach mantles and to avoid the objectionable features of rubber tubing, so commonly used in such connection. By the use of single-swing brackets, a few fittings and pieces of chain and a bell spring, on the lines suggested in the sketch, fixtures can be made in various forms and combinations according to the needs of any particular case. The different weights of burners and glassware may be met by using springs of different strengths. A little oil of good quality should be used on the joints of the fixtures.

No. 6. *Visible Tar Overflow.*—In the new gas works at Zurich, Switzerland, in many respects the finest existing to-day, the tar drains, from the base of scrubbers, condensers, etc., are fitted with sight overflows, so that the character and appearance of the liquid running off may at any time be readily observed. To the outlet pipe of any vessel



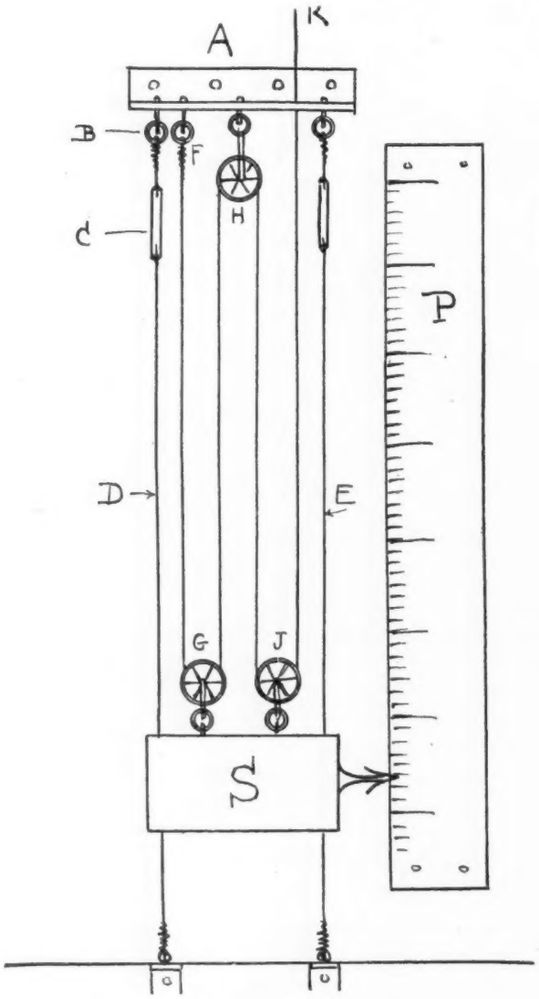
Wrinkle No. 5.



Wrinkle No. 6.

A a special casting *C* is attached, from the bottom of which the usual pipe extends into the tar pot or seal *B*. The tar flowing from *A* has to flow up, over and around the lip or edge of the pipe at *E*, and in such passage the amount and character are readily observed through the glass cover *G*.

No. 7. *Gasholder Scale Board.*—At Zurich was also observed a gasholder scale board of simple and neat design. On the outside of the steel tank, near the top, is fixed a piece of angle iron *A*. Two heavy galvanized wires *D* and *E*, extend from it down to the ground, or base of the tank, and are kept taut by turnbuckles *C*. On these wires slides a heavy iron weight *S*. A flexible wire extends from *F*,

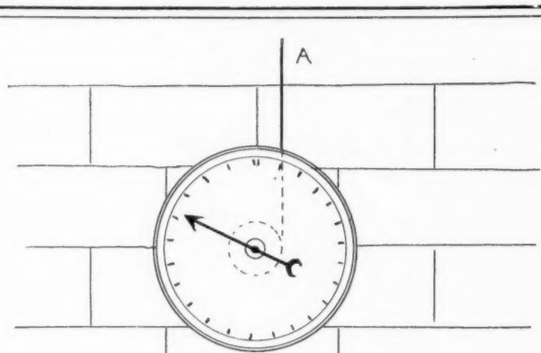


Wrinkle No. 7.

around the wheels *G*, *H* and *J*, and up to the top of the holder from *K*. As the holder rises and falls, the weight *S* indicates the amount of gas contained within. It will be noticed that the effect of the 3 wheels *G*, *H* and *J*, is to gear the weight in the ratio of one to four, so that a rise of the holder of 80 feet involves only 20 feet rise of the weight. The scale *P*, instead of being made of wood and painted, is of enameled steel, lasting i definitely.

No. 8. *Holder Indexes.*—Another holder index, observed in Cassel, Germany, as well as several other places, consists of an enormous dial, some 6 or 8 inches in diameter, affixed to the outside of the tank or holder house, and having a big pointer that is operated by a cord *A*, winding around a drum. The contents of the holder are marked in a circular scale around the edge of the dial. The merit of the device is that, facing towards the yard, it is large enough usually to be seen from any part of the works, and the quantity of gas on hand, especially in holders inclosed in buildings (as is common in Germany) is noted at a glance.

No. 9. *Rack for Retort House Tools.*—In Paris I noticed in the retort house overhead rods and racks by which the rakes and tools, that ordinarily lie around on the floor, are kept up out of the way when not in use. They are hung about 7 feet above the floor, and in line



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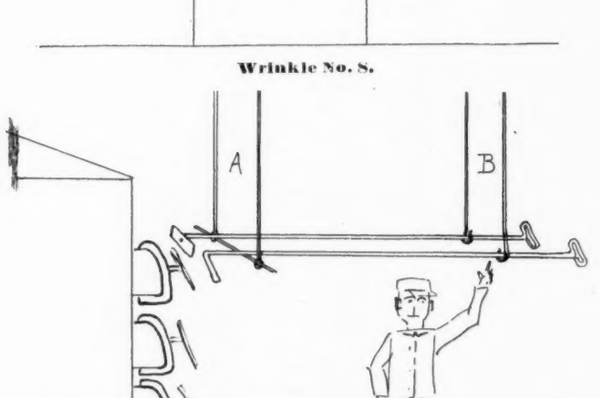
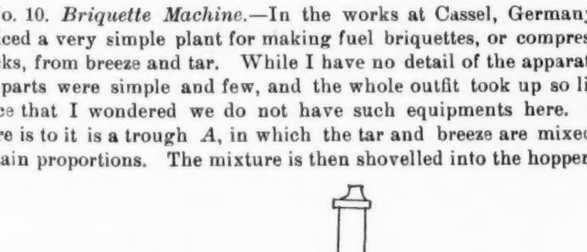


Wrinkle No. 9.

with the retorts, and when they are to be used are simply unhooked from the rods at *B*, and lifted off the cross bar at *A*, without having to swing them around in about 20 feet of space, as is frequently the case.

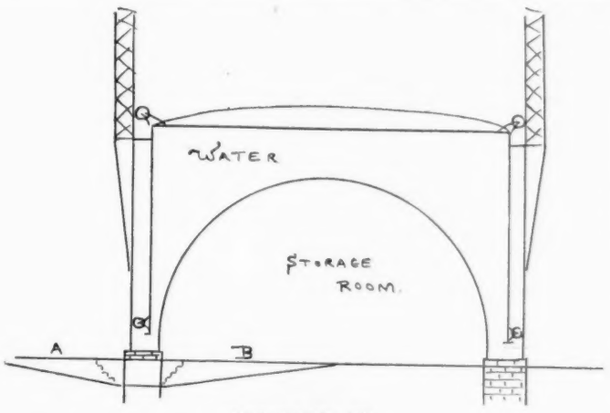
No. 10. *Briquette Machine.*—In the works at Cassel, Germany, I noticed a very simple plant for making fuel briquettes, or compressed bricks, from breeze and tar. While I have no detail of the apparatus, the parts were simple and few, and the whole outfit took up so little space that I wondered we do not have such equipments here. All there is to it is a trough *A*, in which the tar and breeze are mixed in certain proportions. The mixture is then shovelled into the hopper *B*,



Wrinkle No. 10.

and is drawn out by a worm screw *C*, and is forced into a press *D*, where a plunger comes down and punches out the bricks, which come off at *E* with pleasing uniformity and rapidity. The space occupied is not over 12 feet square. The power required is small, and the whole equipment struck me as being an excellent way of working up breeze and tar into a salable product.

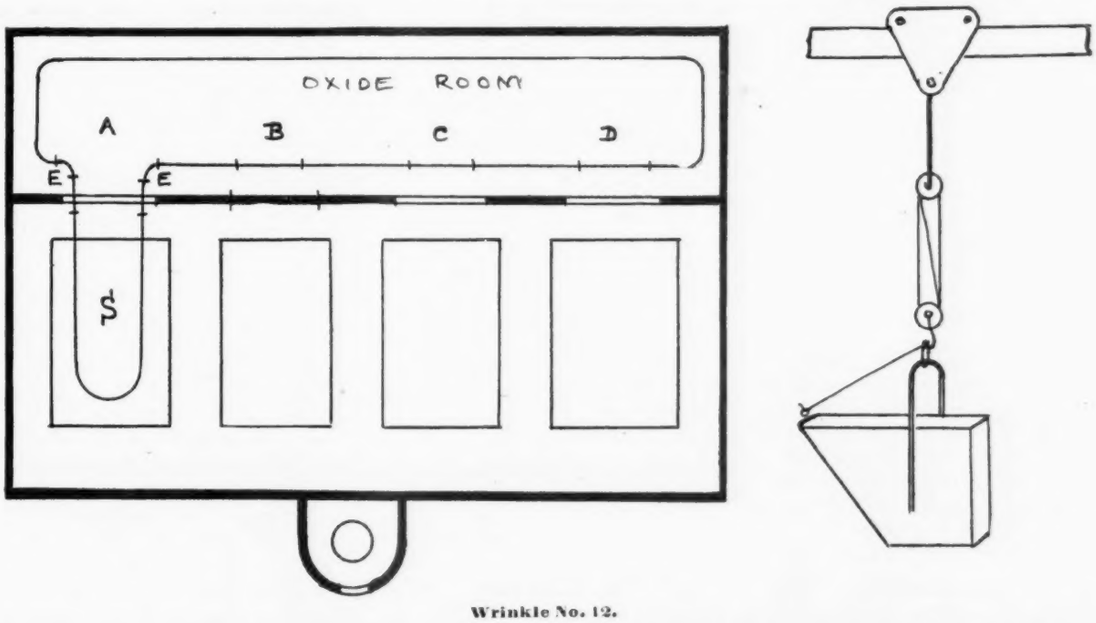
No. 11. *Storage Room in Gasholder Tank.*—At Amsterdam, the city was about to erect the largest gasholder on the Continent of Europe (as distinguished from Great Britain), to have a capacity of about 5,000,000 cubic feet. This was to be in a steel tank, and within the tank a large storage room was to be constructed. In other words, instead of having the usual flat bottom, a hemispherical dome was to be constructed inside of the tank in the space otherwise occupied by water, the chamber under the dome thus affording large storage room. While it was admitted that such construction involved greater expense than an ordinary flat bottom, it was claimed that the additional expense was no greater than that involved in a separate store house of the same



Wrinkle No. 11.

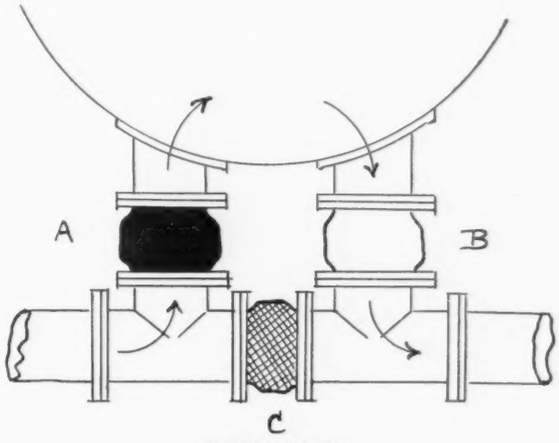
capacity, and that just that much yard room was saved. Access was to be had by steps at *A* and *B*, through an arch in the foundation wall, and an inclined runway was to enable the wheeling of goods in and out. Illumination is provided for in such a storage room by electric lights. Mr. F. D. Marshall, of Copenhagen, advised me that several tanks built on such a plan, but of a smaller size, were in satisfactory use in Denmark and other places.

No. 12. *Oxide Conveyor.*—At Cassel, Zurich and other places I observed a system for handling oxide which seems to be well standardized in Germany and to have a great many attractions. It is based on the idea of having a single story purifying house, intead of the expensive 2 stage buildings we are accustomed to, and of avoiding the heavy expense usually involved for conveyors operated by power, etc. The oxide room is in an inexpensive lean-to adjoining the main building, and a simple overhead rail is arranged around the four sides of the room. In the purifying room is a movable overhead loop of the same rail *S*, which can be moved from box to box as required, according to which one is being emptied or filled. Connection is made from this loop *S* to the rail in the oxide room, through an open archway opposite each box, by movable pieces *E E*, and short strips of rail placed at *B*, *C* and *D*, when the arch *A* is in use. The effect of this is to give a continuous track from the box being cleaned to all points in the oxide room, and by shifting the track sections any box may be so connected. On the overhead rail run half a dozen iron-tip buckets, which are pushed in succession over the box, filled by the workman, pushed out and back again into the oxide room and dumped. The claim is that in emptying a large box it is not appreciably harder to shovel the oxide into a bucket hanging near the workman than it is to shovel it into a fixed 20-inch pipe or chute in the bottom of the box; that practically all wear and tear of a conveying plant is avoided; that the investment expense is low and the general results are as economical as any system whatever. Certain it is that some of the largest plants work upon this simple arrangement. In the Cassel plant the center seal was placed in an external addition to the main building, entirely sealed off from it, increasing safety and cleanliness.



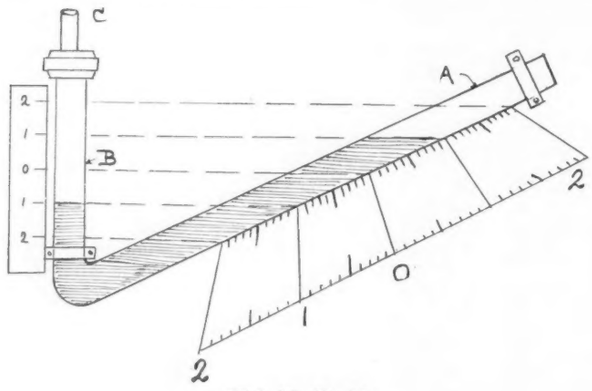
Wrinkle No. 12.

No. 13. *Safety Bye-Pass Covers.*—In Berlin, in the works of the Imperial Continental Gas Company, all of the valves forming bye-passes to the different apparatus in the works were painted in such a way as to considerably facilitate their proper manipulation, and decrease the chance of making a mistake and working the wrong valve. It was assumed that upon entering any apparatus the gas was "foul" and the valve controlling the inlet would be painted black. It was assumed that the gas on leaving any apparatus was "clean," and the valve controlling the outlet was painted white. It was further considered that the bye-pass valve to any apparatus was sort of a "danger" valve, or one only to be used in emergency, or under special circumstances and as such was painted red. The result was that the workmen around the premises quickly learned that every black valve meant an inlet to something, and every white one an outlet, and mistakes in shifting them almost entirely disappeared. In the sketch *A* is the black inlet valve, *B* the white outlet, and *C* the red bye-pass.



Wrinkle No. 13.

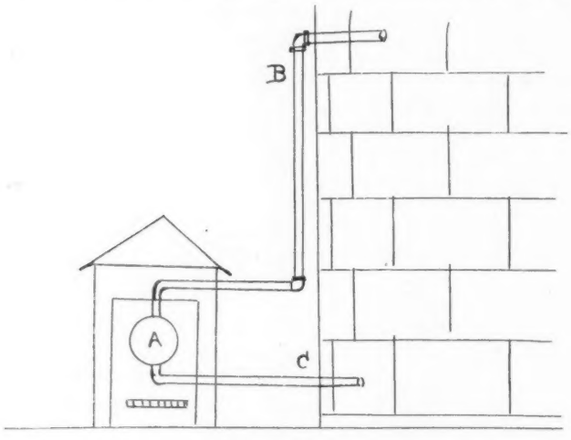
No. 14. *Magnified Gauge Scale.*—In Berlin was also noticed an arrangement by which the tenths of an inch and the scale used in connection with an ordinary water pressure gauge were intensified or exaggerated, so that the marks were more easily read. Instead of the ordinary U shaped glass, one leg *B* was vertical, while the other *A* was extended out on an angle. The usual gas connection was made at *C*. Two inches pressure in the leg *B* would elevate the water a correspond-



Wrinkle No. 14.

ing height vertically in the leg *A*, but the distance traveled, *measured on the slant*, would be about three times the distance traveled by the water measured vertically in the leg *B*. This distance was laid off on the slanting leg *A* and divided into tenths, and the scale on that leg used as the working scale.

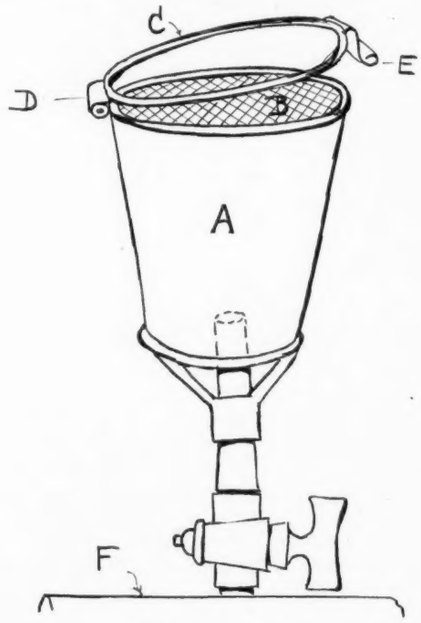
No 15. *Heating Gasholder Tanks.*—In this country there seems to be a good deal of diversity of opinion as to the best way to heat gas holders, especially those that are at a distance from the works. On the Continent, the arrangement I observed as mostly in use seemed to me effective, simple and safe. In a sentry box, alongside of the tank, a small boiler *A*, would be set up. From this boiler, simple pipe connections would be made to the top and bottom of the tank at *B* and *C*. A fire being started under the boiler *A*, a hot water circulation would be established and readily maintained at whatever intensity was desired, according to the weather. This arrangement does not involve



Wrinkle No. 15.

the question of steam at all. There is no chance of accumulating pressure, as in the steam boiler, by negligence or non-attention, and there is no water supply to a steam boiler that has to be watched. It is simply a hot water circulating arrangement, safe, dependable and economical. Where no man is available for oversight, I can see how such an arrangement could be kept going with several large Bunsen burners, burning the company's own gas and keeping the water in the boiler warm and maintaining the circulation automatically and as long as the gas supply holds out. While this would be more expensive than coke, the plan might be a great help in a pinch.

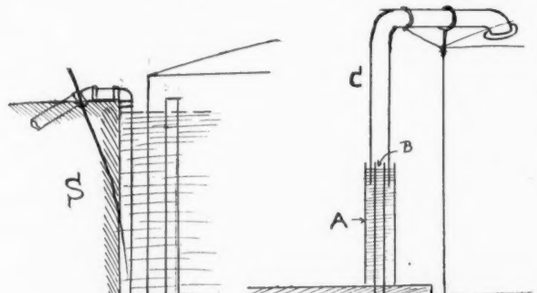
No. 16. *Holders for Test Paper.*—At one of the works abroad I observed a simple little arrangement for holding testing paper when testing the condition of the gas in the works. For instance, on the inlet and outlet of a P. & A. tar extractor in Berlin is a pet-cock, over which is slipped a tin cone *A*, having a gauze top *B* and a lid frame *C*, hinged at *D*, and with catch at *E*. A piece of paper is inserted over the gauze and the lid closed down holding it firmly in position. The gas being turned on, the paper is stained with tar in proportion to the amount in the gas. A similar paper attached to the outlet pipe is stained, but to a much lesser degree, according to the effectiveness of the apparatus in removing the tar. The same device might be used for holding acetate of lead paper, or other prepared paper for testing around the works. In such work I noticed the use of a sand glass as a simple and con-



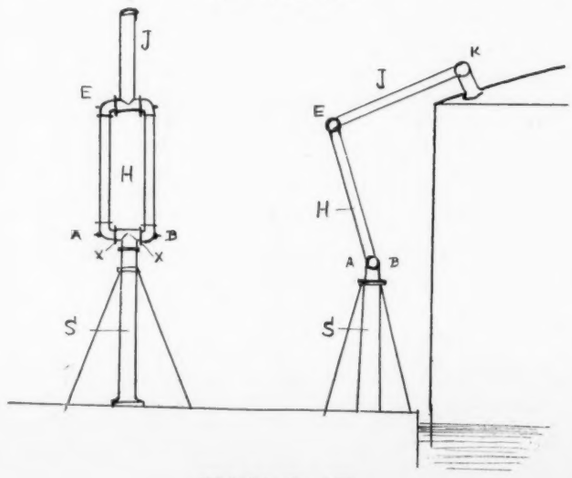
Wrinkle No. 16.

venient means of taking observations of exactly 1 minute. The whole contrivance, I should think, could readily be made from one of the forms of nursery burners on our market.

No. 17. *Special Holder Connections*.—In this country when the connections to a holder become insufficient or broken, a new connection is usually made by dropping a U-shaped pipe over the edge of the holder tank, as shown at *S*. The objection to this is that it is difficult to arrange for sufficient drip pot. In Belgium I noticed a holder, connected as shown at *K*. The inlet pipe *B* comes up through a vertical standpipe *A*, which outer pipe is filled with water or non-freezing oil. A light wrought iron pipe *C* is fastened to the crown of the holder, and goes down into the stand-pipe *A*, sealing in it like the lid of a purifier.



Wrinkle No. 17a.



Wrinkle No. 17b.

As the holder rises and falls, this pipe *C* rises and falls also, telescopic fashion, maintaining the gas connection. In France a very common holder connection is also external and above ground, but made of flexible links of pipe, as shown at *M*. The fixed stand pipe *S* conducts the gas about half way up to the top of the holder and terminates in a tee. Two lengths of smaller pipe form the next link *H*, connecting by elbows to the tee and to the next link *J*. The elbows and tees at *A* and *E* are made with smooth-faced flanges, which no doubt have recesses or off-sets in order to keep them in line and a lubricant to enable easy working. A through bolt from *A* to *B* keeps all in position. The entire arrangement is made of light wrought iron pipe usually, and, if sufficiently protected against freezing, works very satisfactorily. Such a connection is in use in this country at Danbury, Conn.

No. 18. *Straight Reading Meter Index.*—Mr. Wm. M. Blinks, of Michigan City, Ind., while not exactly contributing a wrinkle, suggests as one of the practical little questions of the business the desirability of having meter indexes of the straight reading form, instead of the 3 dial form universally in use. It is an undoubted fact that a great deal of explanation has to be made to enable gas consumers to properly read their meters, and that gas companies further would like consumers to be able to readily read them. Such results would be very much facilitated if a dial were used, such as is used on some makes of water meters, showing nothing but the figures of the current reading. Such a dial would also almost entirely remove mistakes in reading by meter readers. Will some one say why such a change in form of dial would not be an improvement over the present practice, and whether it is feasible to incorporate such a dial in gas meters? A cut is given of a water meter with such a straight reading dial.

Wrinkle No. 18.

Discussion.

The President—Editor Shelton's very interesting compilation of novelties is before you for discussion.

Mr. Egner—I would like to ask what advantages lie in intermittent sprays for coal gas scrubbers. An intermittent spray for water gas scrubbers might be of some use.

Mr. Jenkins—Speaking from the standpoint of an ex-Editor of the Wrinkle Department, I think we were very fortunate in having Mr. Shelton this year as editor, as you will find 13 of the items came from his personal observation. I think I can answer Mr. Egner's question. The intermittent spray works in this way. A small spray continuously running gets choked or clogged up occasionally underneath. In a small spray, the stream of water goes in one direction. The intermittent spray gives a heavier discharge of water each time it operates, and you can regulate it so that it will give just such quantity as you need, by regulating the supply to main tank, as shown. Several points in this wrinkle collection seem to me to be especially good, one of which is the anti-vibration attachment for fixtures. Many of us can take them up in good shape. In places in smaller towns, where the floor above the ceiling is jarred by the handling of trunks, etc., as in a hotel for instance, in an attempt to light the office, if there is a hallway above, you shake the mantles off the Welsbach burners in short order. Another interesting wrinkle refers to the briquette machine. I would like to know whether or not any attempt has been made in the United States to make briquettes from coal tar and breeze, and what the results were. The heating of gasholder tanks, as shown in No. 15, is not new, but it is a good idea. In Columbus, O., they have had a like device in use for 2 or 3 years with natural gas for heating. Some trouble arose occasionally in the outlet pipe choking up because of sediment from water, lime or the like, but outside of that it worked very satisfactorily. One point in No. 17 puzzles me. How is that holder going to come all the way down if that apparatus is above ground as shown? It would look to me that, when the pipe *C* has been immersed in *A* down to the point at the top of the pipe *C*, the holder has to stop. Probably Editor Shelton will explain that to us. No. 18 shows I think a very valuable thing. I have been at a loss for a number of years to know why we have not been able to get something of the kind, the same as water meters. We see it done every day of the year on the street railways, where the fare register records a straight reading, and while we sit in the cars we can read it just as plainly as we can read figures in a newspaper or a book. Yet we have to send men out of only ordinary intelligence, to read the company's meters, the hands of which will get bent occasionally, or the man himself may look a little crooked at the hand and take one figure for another. We have numerous mistakes of that kind. Some 2 years ago, a prominent firm in the United States claimed they would have an attachment for meters that would give us straight meter-reading indexes, and I understand that they have about perfected that arrangement. I really believe that gas companies will find it much more satisfactory, and can afford to pay a little bit more for indexes of that kind, in order to avoid as many errors as possible. The errors of reading only give a proof to the consumer, so he thinks, that we do not make out our bills correctly, and we only correct them when he makes a kick.

Mr. Doty—Referring to Wrinkle No. 18, to supplement what Mr. Jenkins has said of the prominent firm of New York. They showed me a straight reading dial, and probably showed the same to Mr. Jenkins. It is the invention of Mr. T. R. Beal, of New York, whose father is at this meeting, and I am sure he would be glad to recite to us the nature and advantages of his son's invention.

Mr. Beal—In answer to Mr. Doty I may say that one of my sons, employed at one time in our general office, became convinced that a straight reading index for gas meters would prove valuable in our business, and he invented a lever device, a number of which were made and put to the test of use, and proved fairly satisfactory. It was quite a problem, however, to secure all the necessary features in such an index. To be successful it must be reliable, durable and supplied at a nominal cost. He has recently told me in a letter that he now believes that he will soon be able to offer through an appliance firm a straight reading meter index that will be adopted by many gas companies and appreciated by most gas consumers.

Mr. Odiorne—Referring to Wrinkle No. 1, I would say I used a device not unlike that suggested, but not finding a telegraph post always conveniently handy, I used a piece of 4 by 6, about 4 or 5 feet long, with the vice bolted on, dug a little hole, stuck the piece down close by where we were working and used it. It is very handy. Referring to No. 3, for cleaning deposits from the outlet of a gas machine, I have a device that I think is an improvement on the one shown. It consists of a small hand hole fitted with a cover and clamp so that it can be removed and placed back very handily right close to the floor of this outlet pipe, which is the pipe that connects with sealpot. Remove cover and close stack valve on top of the machine, start up the blast, letting the blast continue down this outlet pipe, and out this hand hole. It will burn everything out clean in a very few minutes. In fact it probably will not take more than 5 or 10 minutes, about every second or third day, to clean thoroughly. Another Wrinkle which I failed to contribute to Editor Shelton I may now suggest. In laying mains, and crosses at the intersections of streets, with the expectation of extending the pipe, but not wanting to use it in the present, I put in a crock, instead of an iron stopper, to close up the end—a heavy crock or jar made of ordinary potter's clay—and cement it in. This makes a perfectly tight stopper. When you want to remove it to extend your pipe simply take a hammer and knock it out. It takes but half a minute, whereas if you had used an iron plug, you would have to dig probably half an hour and delay your work very much. I find this very handy and convenient. I have never found the crock to leak, and it doesn't expand or contract.

Mr. T. D. Miller—Does Mr. Odiorne refer to an iron plug with a head on it, or was it a straight plug that gave him trouble when taking it out?

Mr. Odiorne—They generally have a head.

Mr. Miller—All of our plugs are made with a slight taper, so that when we want to take one out a few blows of the hammer will loosen it enough to get it out without any difficulty.

Mr. Odiorne—I have never used one with a taper.

Mr. Lane—If you put a solid 1-inch wooden block in back of the iron block, you will find little difficulty in removing it.

Mr. Steinwedell—These wrinkles are all very good—both the domestic and foreign. Regarding the intermittent spray, Mr. Doherty had a sketch to small scale in a recent Association meeting, but I think this one shows it much plainer. The principles are slightly different. A number of varying devices for spraying tower scrubbers have been brought out. Mr. Chollar has an admirable one, and if he will tell us all about it I think the Association would be benefited. Regarding No. 6, it looks to have the disadvantage that the glass globe has to be gas tight, unless there is sufficient seal inside of the scrubber to prevent the gas from getting outside. In last year's Wrinkles I offered a suggestion in which the seal was in the overflow. It is a kind where the globe is loose and can be fitted and re-sealed at any time. No. 13 is a fascinating idea, and could be carried on a little further with advantage. For

instance: Color the steam, water and gas pipes; the water pipes could be distinguished, as between hot and cold water carriers, by different colored paints, which would lessen the liability of mistakes in making connections. The European Wrinkles are all very good. I have seen them myself. The method of heating gasholder tanks is generally with coke, breeze or any loose fuel you happen to have around, but the climate there in winter is much milder than ours. They don't have any cold waves or temperatures of the 25° below zero sort.

Mr. T. D. Miller—Does Mr. Shelton know of the use of some kind of special holder connection, referring to Wrinkle 17, on one of the holders in New Orleans, La. (it was there in 1896), by a jointed pipe connected to the top of the holder, just like the last one shown in No. 17?

Mr. A. E. Forstall—In connection with heating gasholder tanks, the wrinkle says this arrangement does not involve the question of steam at all. It is all right for tanks. How about the cups in a multiple-lift holder?

Mr. Baehr—In connection with Wrinkle No. 2, the device we have in use in Denver consists simply of a barrel set right above the top of the scrubber, with a siphon outlet, the pipe of which dips into a small galvanized pan inside of the scrubber, resting on the plate of wood which covers the whole scrubber inside. That plan acts just like this in the illustration. Whenever the siphon begins to work that water overflows on this plate which is perforated with numerous holes, and is thus distributed easily over the whole scrubber.

Mr. Norris—No. 15 is shown here applied to a steel tank. It can very readily be applied also to a single-lift holder with a brick tank by putting a boiler down in a hole. This arrangement has been working for years very satisfactorily indeed, on single-lift holders, simply by depressing the boiler, and working it as a circulating hot water heater.

Editor Shelton—Regarding the question as to whether anyone has made briquettes in this country, I do not know of any gas company that has worked up this practice. I understood, however, that a company, located in Pittsburg, Pa., whose advertisement I recently saw, was prepared to furnish equipment for briquetting or making pressed bricks of anything you wanted, any product from chemical works, gas works, industrial works, or anything else. That firm is making a specialty of briquetting apparatus. Through that means this matter can be investigated and worked up if anyone is desirous of so doing. As to the special adjustable connections to the gasholder, I would recommend to Mr. Jenkins that he should not work to scale on that sketch. I simply drew the sketch to indicate the idea without any thought that it would show the exact relative rise and fall of the parts, but simply the relative parts in their order establishing the connection. As far as the connection at New Orleans is concerned, that Mr. Miller makes reference to, that was hardly as pretentious or definite a flexible connection as the standard ones used on the other side. It was simply an 8-inch wrought iron pipe, and motion was taken by slipping on the threads, which was a very crude way. It was a temporary rig, not expected to be a permanent connection. Mr. Steinwedell's remark, as to the hot water taking care of the cups, I think is a proper one. It was not to take care of the cups, but to take care of the tank at large. I do not see, however, why a water heater could not be gotten up to send heated water to the cups by some appliance, so as to furnish heat in the whole holder, with a little maneuvering.

Mr. Barret—Regarding the briquette matter, I will say that, 12 or 15 years ago at least, when we had more breeze than we knew what to do with, we tried the plan of preparing it. It made an excellent fuel, but as the cost was in excess of what we could purchase other suitable fuel for, we quit it. I think that would be the general experience; not that the fuel cannot be made, but that the expense is more than is warranted by the returns received.

On motion of Mr. Egner, a hearty vote of thanks was tendered to Editor Shelton for the very interesting budget of Wrinkles prepared and presented.

Resignation of Editor Shelton.

The Secretary then read the resignation of Mr. F. H. Shelton from the editorship of the Wrinkle Department. On motion of Mr. E. H. Jenkins the resignation was accepted.

Committee on Place of Next Meeting.

The President announced that Messrs. Z. T. F. Runner, Rollin Norris and James Somerville had been appointed a Committee to name the next place for meeting. A motion for a recess was then adopted.

First Day—Afternoon Session.

The President introduced Mr. John Gimper, of Galveston, Tex., who read the following paper on

A STORMY EXPERIENCE.

Mr. President and Gentlemen of the Association: It is at the request of your Secretary that I have the honor of presenting you this paper, upon my experience in connection with the memorable storm of September 8th, 1900, at Galveston, Texas.

Oh! that a man might know the end of this day's business, ere it come; but it sufficeth that the day will end, and then the end is known. And when on the next morning the clear sunshine revealed the appalling picture of destruction of life and property we realized how futile are the works of man against the elements of nature.

By reason of that great storm the Galveston Gas Company suffered a considerable loss, in the destruction of four gasholders, retort house, shop and warehouse, coal shed, governor house, fence wall and Superintendent's dwelling. The holders are known to us as holders A, B, C, D, and will be so designated hereafter. All the holders were upset, and more or less damaged by the wind, and left lying in the same direction and angle of repose, as you will notice from the photograph. Holder C is not visible, as it lies directly behind holder D, which you will notice in the foreground.

Holder A has a diameter of 51 feet, is 18 feet high, has 6 cast iron columns and cast iron guide frames, with 18 inch lattice girders; bottom curb is of 4 by 4-inch angle iron. The girders and columns of this holder remained intact, but the guide frames of 3 columns were broken into many pieces. A hole was stove into one of the top-side sheets, and a rent was made on a top sheet alongside a carriage, which had strained against the guide frame and column, showing plainly the fierce struggle it had with the wind before succumbing. The bottom curb was considerably bent and twisted, and 2 bottom carriages were broken off.

Holder B is 64 feet in diameter, 18 feet deep, has 6 cast iron columns and cast iron guide frames and 18 inch lattice girders. The columns of this holder were secured by 4 bolts to a cast iron bed plate, and a fifth bolt, which passed through an extension of the column and bed plate direct into the brick work. This fifth bolt was broken on 3 columns, and on the other three the extension of column base was broken, but all the other 4 bolts kept their places. Some were strained enough to let the columns lean out of plumb. The girders of this holder were hanging to the standing or leaning columns in every direction, but no holes were stove in this holder.

Where the upturned lower curb was resting on the brick wall, it had ground channels on both sides into the brickwork also showing its death struggle. The bottom curb of this holder is composed of 4 by 4-inch angle iron, which was bent and twisted so badly that three sections of it had to be cut out and shaped again to the proper circle.

Holder C is 70 feet in diameter, 18 feet deep, has 8 cast iron columns, with steel guide rails and lattice girders of usual depth; it has a high crown top with truss frame supporting it. Every column of this holder was broken near the base, the girders lying in every direction; one had stove a large hole in the top of the holder. The bottom curb is composed of 4 by 4 inch angle iron. It was bent to an angle of about 25°, extra splice, and the splice piece broken. It is the worst wreck of all the holders. One of the columns went down in the tank.

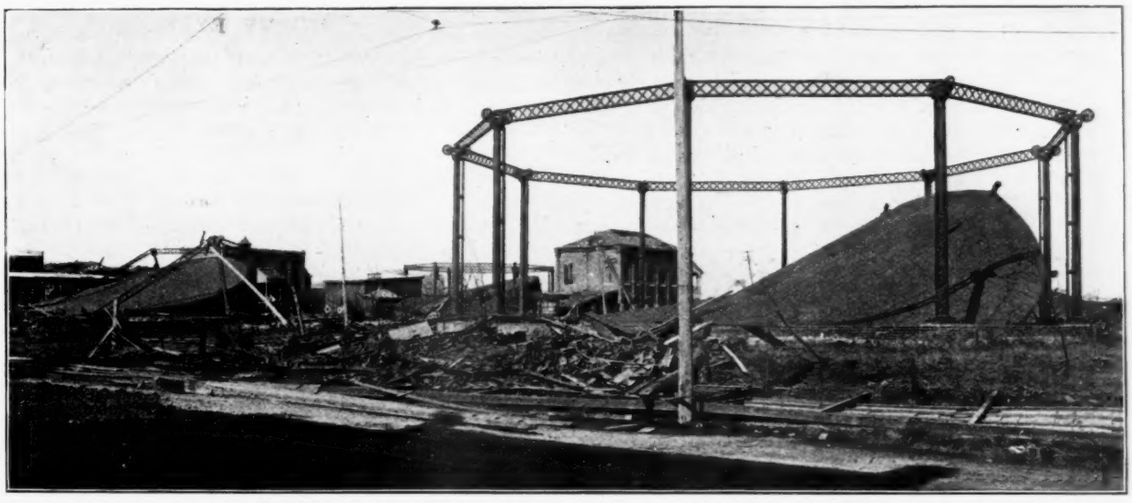
Holder D is 80 feet in diameter, 20 feet deep, has 10 cast iron columns with steel guide rails, lattice girders of usual size and depth, bottom curb 4 by 6-inch angle iron. The column, guides and girders of this holder stood intact, but it was upturned more than any except C. The bottom curb was fully 9 feet above the brick wall at its highest point, and as much as could get through between 2 columns was hanging beyond the brickwork.

The inlet and outlet pipes of all the holders were not damaged. Some doubt was entertained by me as to the clear condition of B's inlet, as a large quantity of twigs and weeds had collected on the top of this pipe, but after its removal it was found that the pipe was only full of salt water.

The destruction of the retort house was total, from the charging floor up, or 10 feet from the ground level. The building was carried in a mass of ruins into the street below. The benches sustained comparatively little damage. The chimney of each bench was carried away and the flues partly filled with brick and slate. The connections from hydraulic main to exhauster room were broken to pieces. Two mouthpieces and one bridge pipe comprise all the damage to the benches, aside from the soaking of water from top and bottom.

The warehouse and shop, a frame structure 26 by 80 feet, with contents, tools, stock of pipe and sundry other things, and a coal shed 50 by 100 feet, were blown away and floated into an indescribable mass of ruins.

The governor house, a small frame building, was also blown to pieces



and floated away. The brick fence wall, surrounding one block, was laid flat. It was 7½ feet high with pilasters every 9 feet. The purifying house suffered but little damage, only the glass being blown from the windows.

The dwelling house of the Superintendent suffered the loss of chimneys, slate roof, window glass, and the corresponding interior damage from 4 feet 1 inch salt water on lower floors and rain water in every room from above. This comprise the damages at the works.

To get into working order again, with retort house and holders destroyed, 27½ miles of street mains full of salt water, service pipes broken in every wrecked house, meters crushed and full of water, the slimy mud over everything, the mass of ruins of our own and that which floated from our surroundings upon us, our stock of coke scattered, loads upon loads of paving blocks from the surrounding streets, lumber from planing mills, bales of cotton, a hoisting derrick from a builder 6 blocks away, roofs from other buildings, sash, blinds, doors, all this piled up into a promiscuous mass, looked like no small undertaking. Add to this the great demand for laborers by the city and everyone who wanted to make repairs and clean up their premises, the immediate advance in price of labor, the difficulty in getting material of all kinds, with our 3 railroad bridges across the bay destroyed—under all these adverse circumstances it was a slow and expensive operation to rebuild.

I knew I could make gas on short notice with our benches, but could not store it without a holder, hence my first attention was directed to the holder question. I had an idea that the smallest holder might be saved. I, therefore, telegraphed to Cincinnati for an experienced builder. Upon his arrival and looking over the situation he said he had never seen such wrecks. His only encouragement to save the little holder was, to use his own language, "We can give it a try anyway." Fortunately we had an old set of lifting screws on hand, and, after cleaning them from rust and rigging up for lifting, we found considerable difficulty in getting a secure hold of the submerged bottom curb; but after many trials we succeeded in getting enough screws to work to raise the holder and float it again in its tank. The hole and rent on the top and side sheets had in the meantime been repaired, and the 3 cast iron guides were replaced by steel rails from holder C.

The experience gained in restoring holder A encouraged us to undertake a like experiment with holder B. But it was evident to me that our lifting screws were not sufficient for this task, hence a set of lifting cables were ordered from the Stacey Mfg. Company. By reason of the destruction of our railroad bridges, a blockade of thousands of cars was the result, and the car containing our lifting cables was held 21 days in Houston, causing almost a standstill of our work.

The lifting of the holder was entirely successful, and, after cutting out 3 sections of bottom curb and reshaping the same, the holder was again floated in its tank. Previous to the raising of holder, new holes were drilled in the wall for hold-down bolts for the new base plates, all the old base plates being broken. New girders had also been ordered. When the guide frames were placed and the top carriages put on the holder, it was found that the holder, by reason of hanging so long in the position where it was left by the storm, was out of its true former circle, but this trouble was remedied by exchanging top rollers from holder C and other changes on guide frames. With these two holders A and B in working order, and enough retorts under fire, I felt that I could give enough supply of gas, and, therefore, on October 18th, gas flowed again into the street mains.

Holder D, having the largest capacity and having all its columns, guide frames and girders in good condition, it was decided to replace it with a new one, consequently a contract had been closed for the same, and by the time holders A and B had been repaired, material for the new holder had arrived.

The cutting out of wreck D was somewhat difficult and slow, because of its position and the water which had to remain in the tank. But in due time this holder was also completed and put to use. Holder C still remains a wreck.

While the repairs of the holders was going on, the retort house was being rebuilt, and early in December we were working again under a roof.

The direct damage to street mains was comparatively small, only two breaks having occurred, one of which we found great difficulty in locating.

The waters of the Gulf have so greatly encroached upon the shore line that the tide is now 1½ blocks further inland than before the storm, so that one line of pipe which extended close to the shore became partially submerged and had to be shortened.

The clearing of the street mains from salt water proved to be no small task. When it is remembered that Galveston is situated upon a level, sandy plain, with quicksand underlying it, then it will be more easily understood how difficult it is to lay mains deep enough to have long stretches of drainage in them. This causes a great number of depressions or traps in the system, and, in addition, such as are caused by sewers, culverts, water pipes and changes of grade the city authorities see fit to make, and for which we have always to give way, so that we have now 235 siphons which must be pumped from time to time. With this number of siphons you can have some idea what a task it was to clear the pipes of water. At the beginning we pumped with a steam pump at the works as long as we could get any water. After that we had to open line after line with hand pumps. In one respect the water in the mains held by these traps was an advantage to us, in that it acted as a valve which we could open with a pump.

During the time we were getting ready to make and distribute gas, a gang of men went through the wrecked buildings to secure broken service pipes, but notwithstanding all the care taken some service pipes escaped our notice until the gas made known the break.

The loss and damage to meters is still an unknown quantity; 265 meters were brought in, good, bad and indifferent. Many were crushed flat, a great number of the dry meters had salt water in them, and it is mainly due to this fact, which makes the damage an unknown quantity to us, that what the effect will be remains to be seen. The report of the meters we sent for repairs is that much extra work was entailed in their repair on account of salt water having entered them. As the flood waters raised, many dry meters which were located near the floors were raised by the water, bending the lead connections so that meters stood upside down, and many meter connections were broken.

The storm occurring on Saturday, the holders were full for a Saturday's consumption of gas.

The usual conditions were reversed on that night; the consumers were the last to get out of gas and the works the first. When the

waters rose above the inlet and outlet of the holders, the works were speedily out of gas and as the waters were filling it compressed, so to-speak, the gas in the mains to their higher level. From reports received from our consumers we learned that the gas burnt under great pressure as late as 2:30 A M. next morning, and one of our farthest consumers cooked breakfast with gas on the morning of the 9th.

It will be remembered that the storm occurred September 8th, and on October 18th gas was again sent out, making 39 days interruption. Deducting from this 21 days' delay of the car of lifting cables, would leave 18 days in which the repairs to the two holders and benches were made, and while the repairs were going on our consumers urged us to hasten our work, for they daily asked, "When can we have gas again?" And after part of our system was again supplied with gas, the cry came, "Our neighbors have gas; why can't we have it? If we had never used a gas stove we could do without it, but now we cannot."

No interruptions have occurred since gas has again been supplied, and all our old consumers that the storm left to us are patronizing us again.

Discussion.

The President—Gentlemen, you have listened to a recital of an experience that probably none of the rest of us have ever had, and one which we all hope we will never have. If anyone ever has had any experience in line with this paper I am sure the Association would like to have a paper submitted on such further experience. Do any questions occur to you that you would like to ask Mr. Gimper?

Mr. Baehr—In connection with an experience like this, I thought it might be well to emphasize the value of photography for taking pictures of wrecked parts of plants. I think it would be very valuable to us if we had a series of photographs showing how various parts of the plant were left after the storm and the steps that were taken to repair the same.

Mr. Egner—This, of course, is a paper that can hardly be discussed, but I think we ought to put on record some expression of our joy, when, on learning a few days after the storm that Mr. Gimper and his men were alive, and how glad we are to see him here with us and to hear his relation of his very interesting experience.

Mr. Gimper—Gentlemen, I thank you very much for your expression. In reference to the photographing, we hardly had time to think what this was going to be, or that it would later on come before a meeting like our present one. The picture accompanying the paper was taken from a photograph and is the only one I have. It is a general view, which was the best I could get. We were all glad to get anything done down there then. The photographers were *rather* disturbed also, and could not be induced to take photographs of every step we took in the work of repairing. I would have been very glad to have them do so. Some of you might be glad to know how this storm happened. I could not embody that in the paper, for the circumstances were such that I could not exactly tell them myself. It came upon us in the darkness, and so suddenly. I did not know when one of those holders was upset, and I was sitting right in my house in the midst of all this destruction. I waded in the water as long as I could with any safety, and then went to my house and stayed there. The holder marked A was right close to my house. In reaching out of the window I could almost touch it, but I did not know when it was upset. The wind was terrific, and the noise was terrible; wind, water, everything were in commotion at the highest pitch. It was a West India hurricane, and its force was of a bounding down and lifting nature, bouncing down and lifting again. I think that was the way in which the holders were overturned. Being raised above the water line, the wind got under them and careened them over.

Mr. T. D. Miller—I would like to ask if the high side of the holders that were wrecked was on the side of the direction in which the wind came.

Mr. Gimper—The wind came from the southeast, and the high side of the holders is the southeast side.

Mr. D. McDonald—Mr. Gimper stated that the water had approached about 1½ squares farther inland than before the storm. I would like to ask him if there has been a permanent subsiding of the land, or if the land was washed away. If it were washed away his longest mains would be out in the water.

Mr. Gimper—The land was washed away, and our mains are out in the water. We now have mains out in the Gulf.

Mr. T. D. Miller—If Mr. Gimper will pardon my personal reference. Mr. Gimper has his residence on the block where the works are. In the latter part of August he had it entirely refinished, repainted, repapered, new gas fixtures and everything. He had it all about completed on the 1st of September, intending to bring a mate from the North down to Galveston. The storm of September 8th deferred the happy event until along in December. The house had to be entirely reconstructed, and Mr. Gimper carries to day, on one of the casings in his dining room, a chisel mark showing that the height the water reached over its floor was 4 feet 1 inch.

On motion of Mr. Egner a vote of thanks was tendered to Mr. Gimper for his paper.

[To be Continued.]

Utilization of the Heat and the By-Products of the Blast Furnace.[1]

Waste Heat in Blast Furnace Working.—There are two items of waste heat in our blast furnace operations which must be self evident to all who have watched the tapping of furnaces—namely, the loss of the heat contained in the iron and the slag. Taking the iron fir t, the results are as follows: Heat lost in 100 tons of pig equivalent to 4.125 tons of coal. Thus in a blast furnace plant producing, say, 100,000 tons yearly, the heat lost in the iron will equal 4,125 tons of coal. The total make of the Cleveland district approximates 2,225,000 tons yearly, and the heat in this weight of iron will be equal to 92,800 tons of coal. If in all our various manufactures it were possible to use the whole of the pig iron made direct from the blast furnaces in the molten condition, in our foundries, iron works and steel works, the problem of utilizing this waste heat would be readily solved. Such a condition of things is not likely to occur for some years to come, and though we do at present use some of this 2,225,000 tons direct for the manufacture of steel, the amount so used is not a very large proportion. All the rest is cast into pigs, and the heat is lost. The problem to be solved, therefore, is how to cast the iron into pigs and utilize its heat also. The method of casting in sand is still by far the most universal one, and most of the iron so cast is judged by fracture as regards quality. Judgment by fracture only is, however, decreasing in importance; the composition as shown by analysis is considered the best guide. Hence casting in sand might be done away with, and some method of casting adopted which would utilize some of the heat now allowed to go to waste.

The heat in the slag is a more serious item of waste that in the case of the iron. A furnace working on Cleveland iron stone produces 30 cwt. of slag per ton of pig, or 150 tons of slag to 100 tons of iron. The heat in 150 tons of slag is equivalent to 10.3 tons of coal. Thus in a blast furnace plant producing 100,000 tons of Cleveland pig yearly, the heat lost in the slag will be equivalent to 10,300 tons of coal. The total make of Cleveland pig approximates 1,300,000 tons, carrying with it 1,950,000 tons of slag. Add to this 720,000 tons of slag produced in the manufacture of other kinds of iron, and we get a total of 2,670,000 tons produced yearly in the Cleveland district. The heat in this weight of slag is equal to 183,340 tons of coal, and if we add to this the loss in the iron, the total amounts to 276,140 tons, over a quarter of a million. At 10 shillings per ton this is equal to £138,070, representing the value of the waste heat in the iron and slag of the Cleveland district. It would, of course, be impossible to recover all this waste heat and apply it to some useful purpose, but a large proportion of it should be reclaimed—a problem for metallurgists and engineers to solve.

As far as I know, only Sir Lowthian Bell in this country has attempted to utilize the waste heat in the slag. Some years ago he took out two patents, the first being as follows: The slag ball was run into a bath of water under a salt pan, the steam rising underneath the pan and heating the brine. This was not successful. In the second patent the slag balls were run into a brick lined chamber, the roof of which was a salt pan, and the exhaust steam from the blast engines was turned into this chamber. When the balls were in the temperature rose to 500° to 600° F., the steam before going in being about 212°. This was sufficient to evaporate the brine, and for some time salt was manufactured in this way. The brine contained 22 per cent. of salt, the pans were 20 feet square, and 44 to 47 pounds of salt per square foot of pan was made. This was also abandoned owing to the action of the heat on the bogies, as the chamber acted almost like a soaking pit, and also if a ball burst inside, it practically meant cooling down the chamber so that men could go in and clear away the destruction. This naturally meant a stoppage of the pan during the cooling down and clearing of the chamber.

There is one direction in which the heat of the slag might be utilized—that is, in the drying of wet ores which are used direct in the blast furnace. The ores from Bilbao often contain over 10 per cent. of moisture. Taking the percentage of moisture in the mixture used for

1. From the address by Mr. William Whitwell, President Iron and Steel Institute, England.

the furnace charge at 8 per cent., there will be 3.04 cwt. of water in the 38 cwt. of ore required to make a ton of hematite pig iron. The evaporation of this water will use heat equivalent to 0.407 cwt. of coke as burned in the blast furnace. This means 2.35 tons of coke per 100 tons of pig, or about 18½ tons per furnace per week. If we could dry these ores by the waste heat of the slag not only should we save coke, but the furnace would work much more freely. When the ores are wet and in a sticky condition a perfect mixing of ore, coke and limestone in charging is not easily attained, the ore remaining in sticky masses, causing irregular working and liability to hanging. Also the gases are so full of steam that they burn very badly, and where a plant is making nothing but hematite pig it is often difficult to keep up full steam pressure without firing the boilers with coal to a small extent.

This question of waste heat is one which touches all departments of iron and steel manufacture, but what I have said above shows very clearly that in blast furnaces alone there is a mine of wealth in waste heat waiting for some one to successfully tap. This is certain, that the time will come when it will be a problem which will have to be tackled and solved if it is possible to do so.

Utilization of Waste By-Products.—The principal by-products of the blast furnace are gas and slag. The former has for many years been successfully applied for heating stoves for the hot blast and raising steam for the blowing engines, pumps, lifts, etc. Seeing that in a well appointed plant the waste gases are sufficient to supply all the needs of the working of the furnaces, it would seem at first sight that this waste product is being fully utilized. But the problem of using this gas in gas engines, and so producing power direct, has of late years engaged the minds of engineers and metallurgists at home and abroad. Though more experimental work in this direction has been carried on abroad than in this country—notably by the John Cockerill Company of Seraing—it is only fair to mention that one of our Vice-Presidents, James Riley, was one of the first to apply in a practical though limited way Thwaite's system of utilizing the power in the gases at the Wishaw blast furnaces of the Steel Company of Scotland some 6 years ago. In the last 2 years we have had 2 papers on the subject by A. Greiner, member of the council, and the new system appears to have derived a great impetus by the success of the gas engine, which was shown by the Cockerill Company at the Paris Exhibition. In Mr. Greiner's first paper he quoted figures showing a surplus of 2,000-horse power per 100 tons of daily make of pig iron, which, in order not to be over sanguine, he reduced to an estimate of 1,000 horse power per 100 tons of pig. In my firm's plant of 3 furnaces at Thornaby the figures work out as follows:

Total gas per hour, 2,628,000 cubic feet. Half of this is used by the hot blast stoves, and about 239,000 cubic feet by the boilers which supply the gantry lift, leaving 1,075,000 cubic feet for raising steam for the blowing engines, pumps and furnace hoist. Taking the requirements of a gas engine at 130 cubic feet of gas per horse power per hour, this 1,075,000 cubic feet of gas is capable of producing 8,269 horse power. The horse power of the blast engines, pumps and furnace hoist engine total 1,388, leaving a surplus of 6,881. Taking an ordinary day's make at 350 tons, this gives 1,900 horse power per 100 tons in favor of gas engines. This calculated result comes out very close to the figures quoted by Mr. Greiner, but if to be on the safe side we take his reduced estimate of 1,000-horse power as the surplus, we get a wonderful result when taken over such a district as Cleveland. The make per day approximates 6,100 tons, and at 1,000-horse power per 100 tons we have a surplus of 61,000-horse power, equal to the consumption of more than 500,000 tons of coal per year. The uses that this power might be put to are endless, driving all the machinery in the works, and supplying electric light and power for outside consumption. Though this problem of utizing blast furnace gases is not yet completely solved, I feel certain it very soon will be, and we may see the day when, as my predecessor somewhat humorously suggested, our blast furnaces will be power producers, with the pig iron a by-product.

We can now arrive at an estimate of the waste going on in the blast furnaces of the Cleveland district. Horse power in the gases, 61,000; waste heat in the iron and slag, equal to 276,140 tons of coal, or 31,500-horse power; total power going to waste, 92,500-horse power.

The horse power of Niagara Falls is estimated at 7,000,000. The amount at present supplied by the Niagara Falls Hydraulic Power & Mfg. Company is about 30,000. Our waste, then, may be looked on as a small Niagara, which, if we could see it in the form of a waterfall, would very speedily convince us of the enormous amount of enery being lost.

Utilization of Slag.—The total make of slag in the Cleveland district is 2,670,000 tons yearly. Many attempts in the past have been made to utilize it and turn it to some useful purpose, with more or less success; but the accumulation of slag goes on and great useless, unsightly heaps are extending in all directions. A stranger from the South of England passing by one of these huge slag hills one rather misty day caught a glimpse of it through the smoke and fog, and thinking it one of the famous Cleveland hills, was anxious to know the name of it. It certainly was a Cleveland "hill," but not such as he was thinking of. Many firms at Middlesbrough not having tipping ground have to send it out to sea at a cost of over a shilling per ton of iron.

The principal uses of slag at present are road metal and paving blocks, or scoria blocks, as they are called. It also forms the basis of artificial stone work and concrete flagging, but these consume only a small portion of the total make, and the problem is to succeed in the directions in which others failed in the past, and also, if possible, find other and more extensive means of utilization.

The setting properties of granulated slag or slag sand, when suitably treated, have long been known. In 1887, J. E. Stead read a paper before the Cleveland Institution of Engineers on "Hydraulic Cement from Cleveland Slag." The process he described consisted in mixing and grinding to an impalpable fine powder 75 per cent. dried slag sand and 25 per cent. slaked dry lime. The powder so produced is slag cement. In strength it compared most favorably with Portland cement, and there seemed every probability of the process being a success, and an important industry established. The main element in the success of the cement rests in the extreme fineness to which it is ground, and this proved the main difficulty, as grinding machinery was speedily destroyed by the slag sand. Since then, however, grinding machinery has been very much improved, and there seems no reason why this manufacture should not be taken up again and made a success. The Skinningrove Iron Company have given us a very practical example of what can be done with slag cement, for their shipping pier is constructed with this material. The important point about this pier is that the cement was made from ordinary slag, without any desulphurizing process being adopted, and contrary to the arguments as to the disintegrating effect of the sulphur, in the form of calcium sulphide turning to sulphate, and the speedy destruction of the pier in consequence, it shows to-day no such signs of decay.

For some years Wilson, Pease & Co., under the direction of Charles Wood, manufactured at the Cleveland Slag Works, Middlesbrough, bricks from slag for building purposes. Slag sand mixed with selenitic lime was pressed in bricks in a brick press, stacked under wooden sheds to air harden for seven days, and then in the open air for five to six weeks to further harden, at the end of that time being ready for the market. The selenitic lime was composed of 80 per cent. unslaked lime, 10 per cent. raw gypsum, and 10 per cent. iron oxide, and 6 cwt. of this mixture was used per 1,000 bricks. Buildings constructed of these bricks 20 years ago are in a very good state of preservation at the present time, the bricks being both hard and tough. Many thousands were shipped to London. Their price was at that time 12 shillings per 1,000, which did not leave much margin for profit; but seeing the present high prices of building materials, there would be a better chance of the manufacture proving remunerative. The appearance of the bricks is somewhat against them, being of a dull gray color.

Slag sand ground fine in a mortar mill with 6 per cent. slaked lime produces an excellent mortar. It sets rather quickly, a disadvantage in one way, as mortar left over the week end is useless on the Monday. T. Kirk, of the Carlton Iron Company, informs me that for many years he has not used any lime at all for mortar, all for his building operations having been made out of slag. He grinds together a limey slag and a quarter of its weight of old brick rubbish, with a few clinkers. A good pug mill is required, and it is essential that the grinding be done most thoroughly. Sometimes granulated slag is used. This mortar sets rather slowly, but sets very hard. In a town like Middlesbrough, where building operations are always being extensively carried on, mortar could be supplied at a constant and cheap rate.

Slag wool is still manufactured, and the production of scoria blocks is increasing. The latter are now being shipped from Middlesbrough, and if they were better advertised and the sale pushed a much greater demand would undoubtedly be created, particularly as their value for paving purposes has been so clearly demonstrated in the towns of the Cleveland district.

Blast furnace slag which is sufficiently soluble to become decomposed in the soil has some value as a fertilizer, not only for the lime it contains, but also, probably, for its contents of silica.

But in spite of all these more or less successful attempts at the utilization of slag, we are practically as far off as ever in getting rid of, usefully, this costly and unwieldy waste product. It has been clearly shown that useful materials can be made from it, and the problem before us is to make their manufacture a success commercially, and at the same time to find out some other means of utilization which will use up, if possible, all the slag made.

The Extraction of Cyanide from the Blast Furnace.—In Bell's "Principles of the Manufacture of Iron and Steel" analyses of the fume at different levels of an 80 foot furnace are given. At a distance of 26½ feet from the tuyeres the fume contains 89.2 per cent. potassium cyanide. The demand for this substance has of late years increased enormously, owing to its extensive use in the gold fields. Attempts are now being made to extract it from the blast furnace fume, by inserting tubes about the boshes, drawing off the fume, condensing and collecting the potassium cyanide. Should this prove successful, it will become a valuable by-product.

Notes on Electric Meter Testing.

By Mr. Arthur T. Smith, in *Electrical Review*, London, Eng.

It is surprising what little attention is often paid to this most important branch of central station working, especially in the smaller stations. Meters are ordered and delivered by the makers, and are put on one side until needed; possibly one is tried to see if it will start, and it is put in circuit with an 8 or 16 candle power lamp. If it starts well and good, the meter goes out; if it will not start, then it is often put on one side for a further consideration later on. To err is human; certainly electricity meter makers are sometimes very human, and it is advisable to test the accuracy of the little slip of paper which is often inserted in the meter and called the "Certificate of Test"

In many stations it would not pay to employ a man solely for meter testing, and it therefore devolves on one of the assistants. And it is this point which is often the cause of the neglect, as each assistant depends on the other, and neither, as a rule, knows what the other has already done. To obviate this, one assistant in a station should thoroughly understand the meters and testing, and not only know how to test a meter, but have a thorough theoretical knowledge of the principles of the meters used on that station. It is, of course, useless to expect a man to know every type of meter made, and hence even in the meter department uniformity of type is advisable; as few types of meter should be used as possible, not only for this reason, but because the spares and duplicate parts to be kept in stock are considerably reduced.

I give herewith a few hints as to the testing of meters, and will take the Chamberlain & Hookham meter as an example. I will certainly give this firm credit for care in their testing, and for their fair dealing in the matter of complaints and inaccuracies. It is satisfactory to know that the difficulty which the makers of this meter at one time experienced with regard to the amalgamation of the armature is now entirely overcome, and I am anticipating no trouble with it in the future. It is sometimes necessary to renew the armature, owing to its being burnt up through a short circuit, or from some other accident damaging it in any way. A little care is necessary in removing the armature and replacing with another.

The mercury should be removed and the meter taken out of the case, then inverted, and the 4 screws removed from the plate holding the pivot and the iron bridge piece. (It is advisable always to unscrew the pivot first to prevent any accident to it) If now the spindle be examined, two small file cuts will be noticed, one on the spindle and the other on the collar of the brake disk; this denotes the way which the little taper pin draws out, and this should be remembered in replacing the pin in another brake and spindle. When the pin is withdrawn the armature and spindle will draw out and leave the disk. On the meter being put together again and filled with mercury, it sometimes happens that an air bubble lodges under the armature. This must be removed or the meter will not start easily, but is easily gotten rid of by tilting the meter and revolving the disk. Before putting in a new armature care must be taken to scrape and thoroughly amalgamate the edge.

To test the meter for accuracy the handiest measuring instrument is a shunted ammeter and a set of shunts by the Weston Company, as with this instrument it is possible to measure currents from .01 ampere to 150 amperes, which gives a range sufficient for all ordinary purposes. It is the best plan to have the shunts mounted on a slate with a switch which throws each shunt in as required without breaking the circuit. The current must be capable of being varied, and this is most readily accomplished by sets of lamps and a resistance for fine adjustments. A booster may be used for higher currents than 10 to 15 amperes. The meters to be tested are all put in series, and I find it handy to put a slip of paper before each one with the number and capacity with any other items which may be needed, such as the testing currents, the constants obtained, etc., the results being finally entered in a book kept for the purpose.

The meters are first tested for starting, and the lowest current at which each starts is noted. With a 5 ampere meter the testing currents may be 1, 2.5 and 5 amperes, and start with .2 ampere or under. In each meter there is a small label on which is written the testing constant, which is "the figure that should be always obtained by multiplying the number of amperes passing through the meter by the number of seconds (or fraction of a second) occupied by one revolution." In practice it is advisable to take 10 times as many revolutions as the number of amperes passing through the meter. For example, testing with 1 ampere, count 10 revolutions, and the number of seconds on the stop watch ought to agree with the value of the constant, that is, with the figures; the decimal point, of course, would be wrong, but that is not needed. With 2.5 amperes count 25 revolutions, and so on.

By this means all calculations are avoided as the constant may be read directly off the watch. Below is an example of an actual test as entered up in the station test book:

No. of Meter.	Size.	Current.	True Constant.	Constant Obtained.	Per Cent. Inaccuracy.	Starting Current.
21,732	5	1	4.67	4.64	.6 +	.2
....	..	2.5	"	4.68	.2 —	..
....	..	5	"	4.70	.6 —	..

Remarks.—Meter brought in dirt under brake disk.

If the meter is too fast on all loads it may be adjusted by slightly lowering the four brake poles above the Foucault brake disk, and by raising the poles away from the disk the speed may be increased. It may happen, however, that the meter has not the same percentage accuracy throughout the range, and may be slow at top load. This may be altered by giving the series coil more effect by inserting a small paper or thin fiber washer between the yoke which is in front of the meter, but if the reverse be the case and the meter is fast at top load, then the washer must be inserted between the back yoke. This weakens the action of the series coils and reduces the speed on top loads.

The 2½ ampere meter which this firm has brought out is a useful size, and especially as the price is lower it will bring down the cost of small consumers. These meters are sent out with the mercury separate, and it is absolutely important that they should be filled immediately on arrival or oxidization of the edge of the armature may take place and the accuracy of the meter be impaired.

The Bastian meter is a useful meter where the consumption with small currents is to be measured. To test this meter no current need be used, as all that is necessary is to calibrate the capacity of the tube containing the electrolyte.

Whatever the type of meter to be tested, accuracy and a methodical way of working are absolutely essential, and experience alone will reveal all the short cuts. I have written these few and brief notes in the hope that they will be of use to some, and that they will also raise the interest taken in this often neglected department of electrical undertakings.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

A fortnight ago we noted that Mr. Albert E. Hay, representing capitalists of Cleveland, O., had been chosen to manage the properties of the Elyria (O.) Gas and Electric Company. We may now add that Mr. Hay has also been named by the same principals to a similar position in connection with the direction of the Lorain (O.) Gas Company.

The United Gas Improvement Company is engaged in constructing for the Worcester (Mass.) Gas Light Company an additional set of its standard, double superheater, Lowe water gas apparatus. The capacity of the set is estimated at 1,000,000 cubic feet per day.

With much regret we announce the death of Mrs. Z. T. F. Runner, the estimable wife of the Secretary and Manager of the Freeport (Ills.) Light and Fuel Company. Her demise occurred at her home, Lincoln avenue, Freeport, the morning of May 20th.

The Philadelphia Company has secured complete control of the property some time ago known as the Braddock (Pa.) Gas and Light Company, but more recently operated by the Monongahela (Pa.) Light and Power Company.

It is proposed to revive the attempt to construct a gas works in Pontiac, Ills. As we have said, a gas works should prove a profitable enterprise there.

The proprietors of the Columbus (O.) Gas Light and Heating Company have declared a dividend of 3 per cent. upon the preferred stock, payable the 15th inst.

AT the annual meeting of the Owosso (Mich.) Gas Light Company the officers elected were: Directors, C. S. Williams, C. S. Rigley, A. D. Whipple, W. E. Stevens, H. S. Dean and O. S. Dean; President, C. S. Williams. The sales of gas for the twelvemonth were something in excess of 8 millions cubic feet—a gain for the year of 3 per cent. The Company gained 67 meters during the year, and a good advance was made in the instance of placing gas ranges. The net price received for gas on all account and use was $1.25½ per 1,000.

AT the annual meeting of the Adrian (Mich.) Gas Company the following executive management was chosen: President, R. A. Watts; Vice-President and Secretary, Chas. H. Raynor; Cashier, S. Milo Dole.

THE formal vote of the shareholders, in the matter of purchase of the plant and franchises of the Rome (N. Y.) Gas Light Company by the Rome Gas, Electric Light and Power Company, resulted in a unanimous declaration to indorse the sale.

THE United Gas Improvement Company is erecting, at the Camden (N.J.) works of the South Jersey Gas, Electric and Traction Company, an installation of its standard, double superheater, Lowe water gas apparatus, with a daily capacity of about 750,000 cubic feet. It is said this installation is to be operated in connection with a coke oven plant.

THE latest we have from Chicago, in the strictly manufacturing line, is the incorporation of the De la Matyr Manufacturing Company, which proposes to manufacture gas meters. The incorporators named are Messrs. R. H. Mather, J. M. Pollock and L. W. Pietsch.

MR. LORENZO SNOW has been elected President of the Utah Light and Power Company, of Salt Lake City, vice the late Mr. George Q. Cannon. Mr. John R. Winder was chosen Chairman of the Executive Committee.

THE new storage holder for the Chico (Cal.) Gas and Electric Company is working satisfactorily. The vessel insures good pressure over the Company's district.

A CORRESPONDENT in Lowell, Mass., incloses the following: "Through the action of the Directors of the Lowell Gas Light Company the price of gas will be reduced to 90 cents per 1,000 cubic feet, the concession to date from October 1st. This is a reduction from the current rate of 10 cents per 1,000. The new price will be the lowest rate in New England, and the Lowell Company has but kept in line with its reputation of being the first to lower the gas rate. Six years ago the Company lowered the rate to $1, which was then considered a magnanimous thing to do, Lowell being at that time one of the very few cities obtaining gas at that figure, and it is but very recently that a bill before the Legislature to reduce the price of gas in Boston from $1 per 1,000 was defeated. Regarding the present reduction, it will, as before said, take effect October 1st, at which time the Company expects that its new gasholder, now under construction on School street, will be finished, together with the other improvements now being made on the plant. At present the place is in a state of chaos, and it would be impossible to get things in running order to warrant the reduction taking place immediately. This reduction of 10 cents per 1,000 means a shrinkage in revenue to the Company on its present volume of business of $35,000 per annum; but President Rogers and his associates hope that much of such loss will be recouped through a large increase in output on lighting and fuel accounts."

THE proprietors of the Cincinnati (O.) Gas and Electric Light Company have applied to the authorities of Hyde Park for the right to lay conduits and string wires in that village for the purpose of furnishing commercial lighting.

THE Chambersburg (Pa.) Gas Company has awarded the contract for the rebuilding of its works to the United Gas Improvement Company. The new generating installation will have a capacity of about 120,000 cubic feet per day, the apparatus being of the standard, double-superheater, Lowe water gas type. Other apparatus named in the contract will comprise a holder to rest in a steel tank, an exhauster and new purifying plant.

WE understand that early this summer the plant at Gloucester City, N. J., which was recently taken over by the South Jersey Gas, Electric and Traction Company, will be shut down, the supply to be furnished from the Company's Camden works. The selling rate at Gloucester will be reduced to $1 per 1,000. The present rate is $1.60.

THE Commercial Gas Company and the Manufacturers Gas Company, which supply natural gas in the Bradford (Pa.) district, have given notice that, commencing the 1st inst., the gross rate will be raised to 27 cents per 1,000, prompt payment (within 10 days) to entitle the user to a rebate of 2 cents per 1,000. This is equivalent to an increase of 3 cents per 1,000.

THE average receipt for gas distributed from the municipal gas works in Santa Clara, Cal., for the month of April, was $1.80 per 1,000 cubic feet. A sliding scale is in force. The output for the month named was 267,000 cubic feet.

THE Atlantic Light and Water Company, to build and operate gas, electric light and water plants at Virginia Beach, Va., has been incorporated. It is capitalized in $500,000 and it is controlled by Philadelphia capitalists. Its officers are: President, Thos. R. Heller; Vice-President, D. B. Saxton; Secretary, H D. Long.

THE American Bridge Company is to furnish the steel work for the new Rogers Hotel, to be erected at the corner of 7th avenue and 55th street, New York.

THE Governing Committee of the New York Stock Exchange recently voted to list $5,274,000 consolidated mortgage, 5 per cent. bonds of the Newark (N. J.) Consolidated Gas Company. The application for listing stated that the Company was incorporated November 30, 1898, under the laws of the State of New Jersey, for the purpose of manufacturing and selling gas, and was formed by consolidation of the Newark Gas Company, having $1,000,000 capital stock; the Montclair Gas and Water Company, having $139,500 capital stock; the Summit Gas Light Company, having $111,400 capital stock; the Peoples Gas Company of Irvington, having $5,000 capital stock, and the Clinton Gas Company, having $1,000 capital stock, all corporations of the State of New Jersey. Its directors, according to the application, have the usual powers conferred by law and by the provisions of the agreement for merger and consolidation. The Company owns all the gas plants in Newark, Orange, East Orange, Bloomfield, Belleville, Clinton, Montclair, Irvington, Harrison, Kearny, East Newark, North Arlington and Summit; also all the capital stock of the Orange Gas Light Company and nearly all the stock of the East Newark Gas Light Company, *i. e.*, $58,900, out of a total issue of $60,000. The balance of the bond issue, $4,726,000, is reserved to be issued as follows: $4,025,000 to refund $4,000,000 first mortgage bonds of the Newark Gas Company, due April 1, 1944, and $25,000 first mortgage bonds of the Montclair Gas and Water Company, due July 1, 1903. The remaining $701,000 is reserved for betterments and improvements. The Consolidated Company owns 456 miles of mains, and on December 1, 1900, had in use 43,220 meters. The capacity of its plants is 8,000,000 cubic feet per day. Its franchises are perpetual, except the East Newark Gas Light Company. The Company has contracts for public lighting with Newark, East Orange, Montclair, Glen Ridge and South Orange. On December 1, 1898, the Newark Consolidated Gas Company leased all its property to the United Gas Improvement Company, a corporation of the State of Pennsylvania, for the term of 999 years, from the 1st day of December, 1898, which lease was subsequently, on the same day and date, assigned to the Essex and Hudson Gas Company, a corporation under the laws of the State of New Jersey. The lease provides, in part, that the lessee shall pay to the Newark Consolidated Gas Company interest upon $4,000,000 at par of 6 per cent. bonds of the Newark Gas Company, until the same are paid or refunded, interest upon $25,000 outstanding bonds of the Montclair Gas and Water Company until the same are paid or refunded, and interest upon said issue of 5 per cent. bonds of the Newark Consolidated Gas Company.

The obligations of the Company are:

Newark Gas Company first mortgage 6 per cent. bonds, due April 1, 1944	$4,000,000
Montclair Gas and Water Company first mortgage bonds, due July 1, 1903	25,000
Newark Consolidated Gas Company consolidated mortgage 5 per cent. gold bonds, due December 1, 1948	5,274,000
	$9,299,000

The application further states that for the year ending December 31, 1900, the Company's income under the lease was $529,357, which was applied as follows:

(*Concluded on page* 854.)

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

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MONDAY, JUNE 3, 1901.

(*Continued from page* 853.)

To interest on funded debt	$498,357
To dividend of ½ of 1 per cent	30,000
To maintenance of organization	1,000
	$529,357

The balance sheet of April 1, 1901, shows:

Assets.

Plants, franchises	$15,297,582.24
Cash	1,417.76
Total	$15,299,000.00

Liabilities.

Capital stock	$6,000,000.00
Funded debt	9,299,000.00
Total	$15,299,000.00

Floating debt none. Authorized capital stock, $6,000,000, 60,000 shares of the par value of $100, all issued, full paid. Directors, Thomas A. Nevins, Edgar B. Ward, A. D. Ball, E. C. Hay, Jeremiah O'Rourke, Adrian Riker and William Scheerer. Officers, President, Thomas A. Nevins; Vice-President, William Scheerer; Treasurer, George Barker.

The Market for Gas Securities.

At the quarterly meeting of the "magnates" in the Consolidated Gas Company, held to-day (Friday), the only thing given for publication was that a dividend of 2 per cent. had been declared, payable the 15th inst. The books close to-morrow and reopen the 17th. The Brooklyn Union change accordingly appears to be postponed. Consolidated shares were fairly active during the week, with a net gain in the bid price for the 7 days of 1½ points over the dividend; a showing that should be well noted by those on the long side. The up and-down trips in Brooklyn Union are continuing; 100 shares in it were sold to day at 216, with 215 bid for it at the close.

The general gas share market is steady, or better, with Peoples, of Chicago, rather more than holding its own. When the significance of the new public lighting arrangement there, so far as gas is concerned, is better understood, Peoples should experience a boom. A very significant item in connection with the New York city situation is the approach of New York Gas, Electric Light, Heat and Power Company purchase 4's to par. A block of those, amounting to $95,000, was sold to-day at 97. If they are worth 97, Consolidated common should be selling well above the quoted prices. Baltimore Consolidated is steady, and there is no "appreciable change" in dear Bay State. The new issue of stock in the Cincinnati Gas and Electric Company is well above par.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JUNE 3.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	221½	222½
Central Union, Bonds, 5's	3,000,000	1,000	106½	107
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	120	..
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	300	310
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	108¼	109
Northern Union, Bonds, 5's.	1,250,000	1,000	106	108
New York and East River Bonds 1st 5's	3,500,000	1,000	111	115
" 1st Con. 5's	1,500,000	..	106	108
Richmond Co., S. I.	348,650	50	70	..
" Bonds	100,000	1,000	.	..
Standard	5,000,000	100	135	.
Preferred	5,000,000	100	155	160
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	114
Yonkers	299,650	500	130	.
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	215	218
" " Bonds (5's)	15 000,000	1,000	118	11
Bay State	50,000,000	50	¾	⅞
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works	450,000	100	24	28
" 1st Mtg. 5's	509,000	1,000	92½	95
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
" " Bonds, 5's	5,250,000	1,000	75	76½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	.	.
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co.	29,500,000	100	104	104½
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	106	107
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	60	65
Preferred	3,026,500	100	84	86
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	215	216
Consolidated, Baltimore	11,000,000	100	61¼	61¾
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	12½	14½
" Con. Mtg. 5's	880,000	1,000	81½	83
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	.	89
" Prior Lien 5's	5,603,000	1,000	90½	100
Detroit Gas Co., 5's	381,000	1,000	..	89
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	35	40
Fort Wayne	2,000,000	..	.	.
" Bonds	2,000,000	..	53	55
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	103½	105
Hartford	750,000	25	240	250
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	60	68
" Bonds, 6's	2 650,000	..	97	97½
Jackson Gas Co	250,000	50	70	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	101½	103
Laclede, St. Louis	10,000,000	100	83	85
Preferred	2,500,000	100	98	100
Bonds	10,000,000	1,000	..	108½
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	66
Louisville	2,570,000	50	110	120
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	102½	108
" 6 per cent. scrip, due 1910	100,000	25	87	89
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	..	55
Bonds, 6's	4,600,000	..	..	103
New Haven	1,000,000	25	280	300
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	115¼	115½
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	

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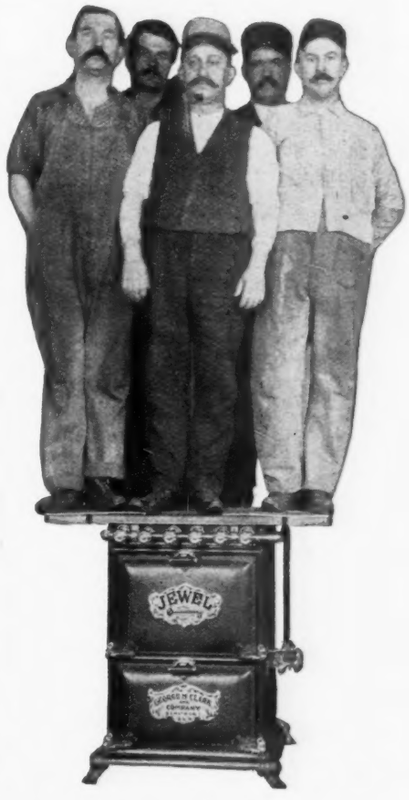

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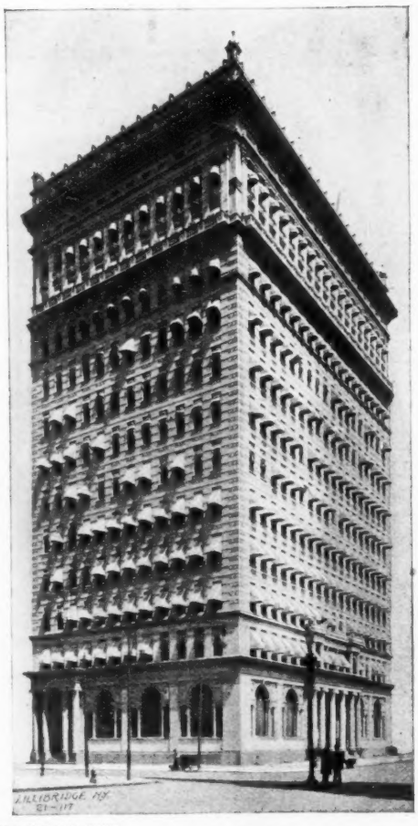

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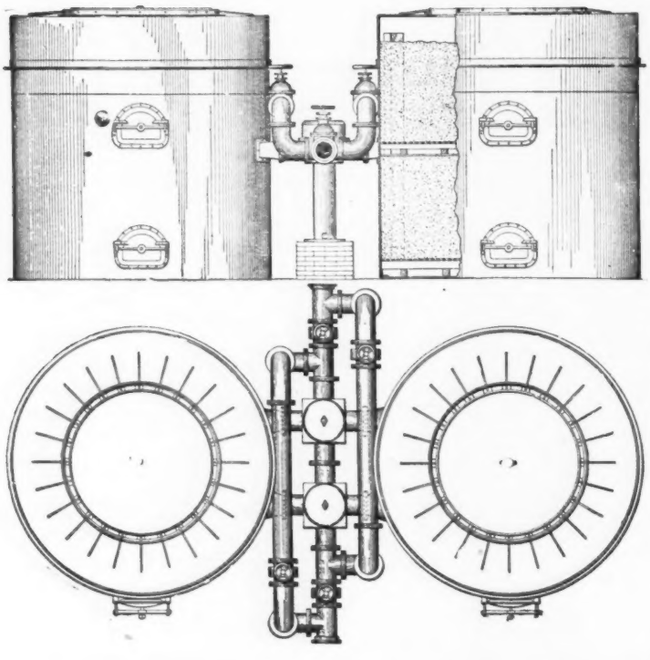

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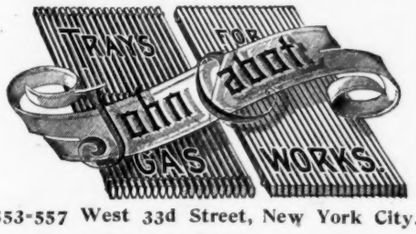

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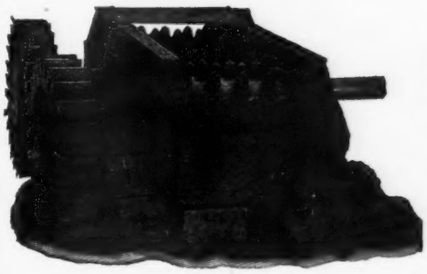

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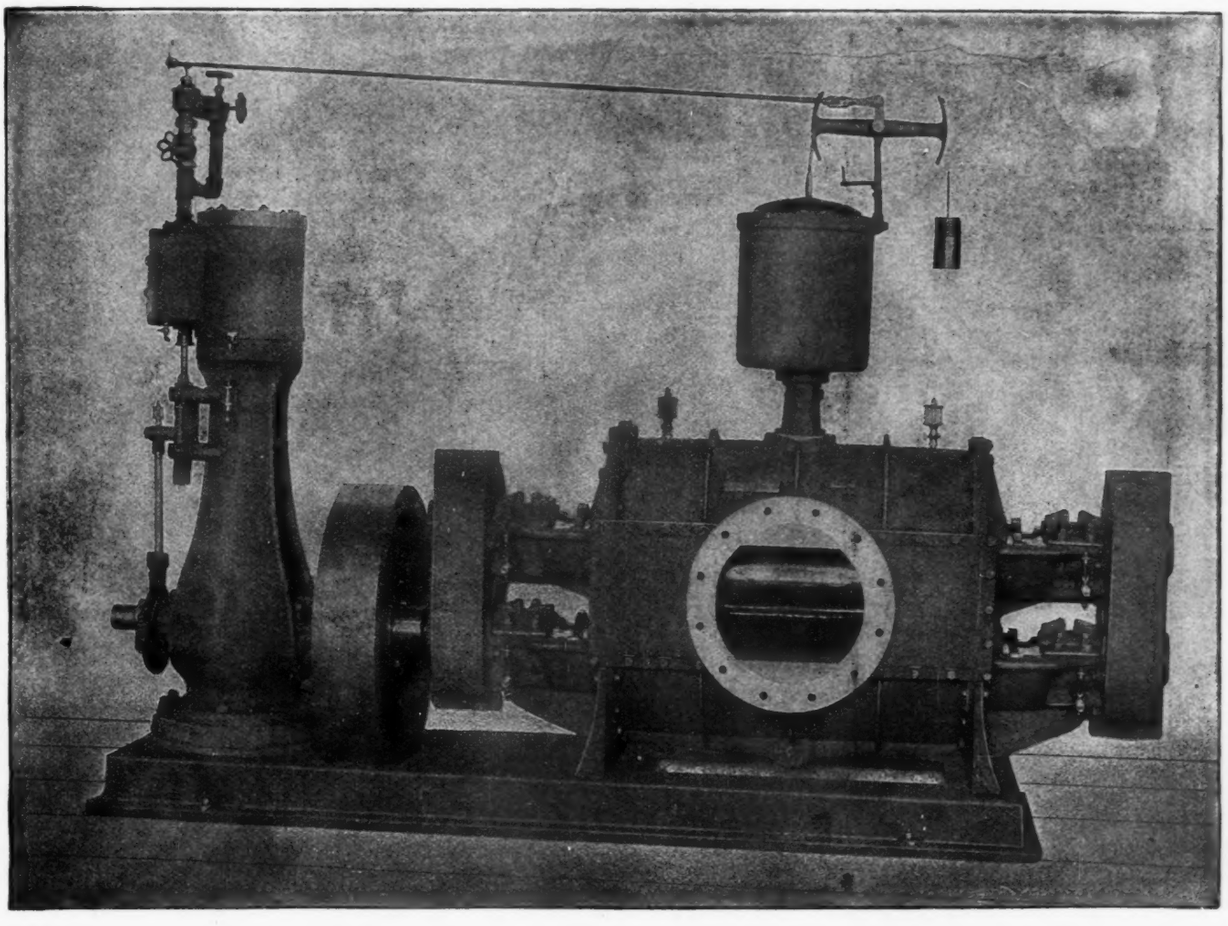

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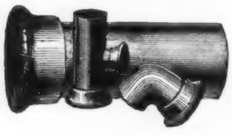

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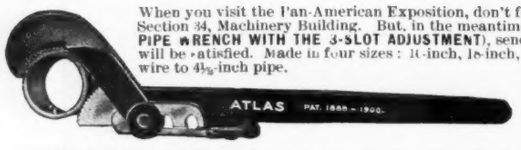

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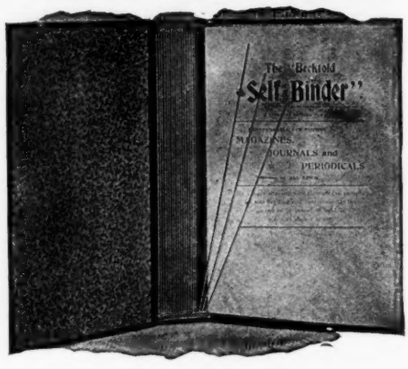

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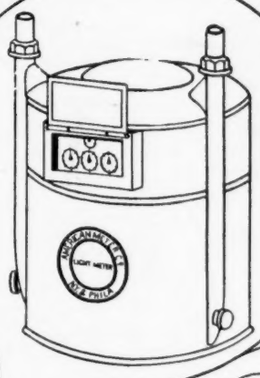
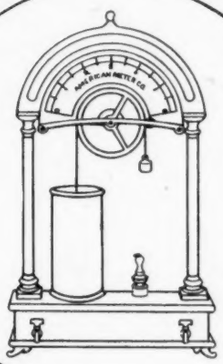
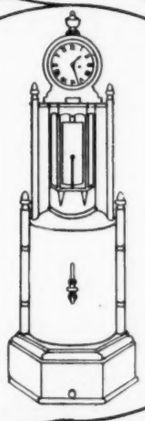
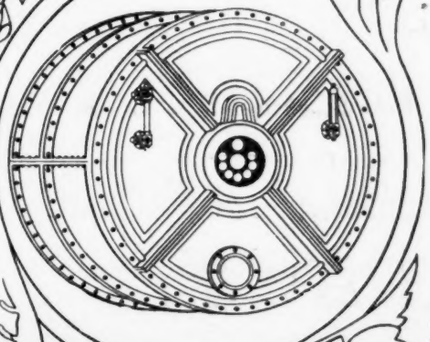








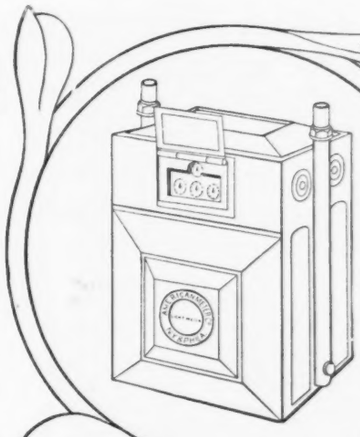
PUBLIC LIGHTING TABLE.

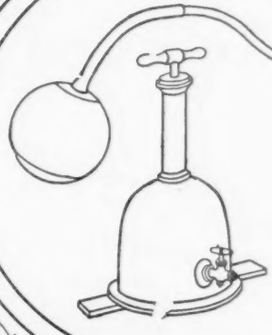
JUNE, 1901.

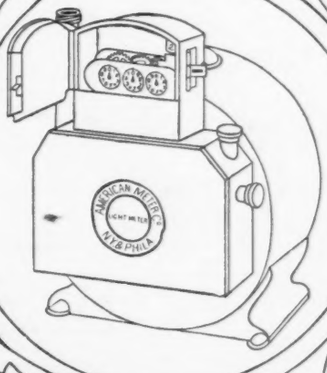
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Sat.	1	No L. FM	No L.	7.15	3.15
Sun.	2	No L.	No L.	7.15	3.15
Mon.	3	7.50 PM	9.30 PM	7.15	3.15
Tue.	4	7.50	10.10	7.25	3.15
Wed.	5	7.50	10.50	7.25	3.15
Thu.	6	7.50	11.30	7.25	3.15
Fri.	7	7.50	12.00	7.25	3.15
Sat.	8	7.50	12.40 AM	7.25	3.15
Sun.	9	8.00 LQ	1.10	7.25	3.15
Mon.	10	8.00	1.40	7.25	3.15
Tue.	11	8.00	2.20	7.25	3.15
Wed.	12	8.00	3.00	7.25	3.15
Thu.	13	8.00	3.30	7.25	3.15
Fri.	14	8.00	3.30	7.25	3.15
Sat.	15	8.00	3.30	7.25	3.15
Sun.	16	8.00 NM	3.30	7.25	3.15
Mon.	17	8.00	3.30	7.25	3.15
Tue.	18	8.00	3.30	7.30	3.15
Wed.	19	8.00	3.30	7.30	3.15
Thu.	20	8.00	3.30	7.30	3.15
Fri.	21	9.50	3.30	7.30	3.15
Sat.	22	10.20	3.30	7.30	3.15
Sun.	23	10.50 FQ	3.30	7.30	3.15
Mon.	24	11.20	3.30	7.30	3.15
Tue.	25	11.50	3.30	7.30	3.15
Wed.	26	12.20 AM	3.30	7.30	3.15
Thu.	27	1.00	3.30	7.30	3.15
Fri.	28	1.40	3.30	7.30	3.15
Sat.	29	2.30	3.30	7.30	3.15
Sun.	30	No L.	No L.	7.30	3.15

TOTAL HOURS LIGHTING DURING 1901.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	220.10	January	423.20
February	192.30	February	355.25
March	180.00	March	355.35
April	158.30	April	298.50
May	140.40	May	264.50
June	135.40	June	234.25
July	138.00	July	243.45
August	156.20	August	280.25
September	174.40	September	321.15
October	202.30	October	374.30
November	220.40	November	401.40
December	241.30	December	433.45
Total, yr.	2161.10	Total, yr.	3987.45







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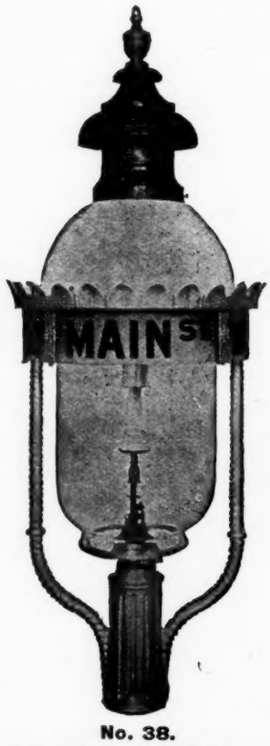

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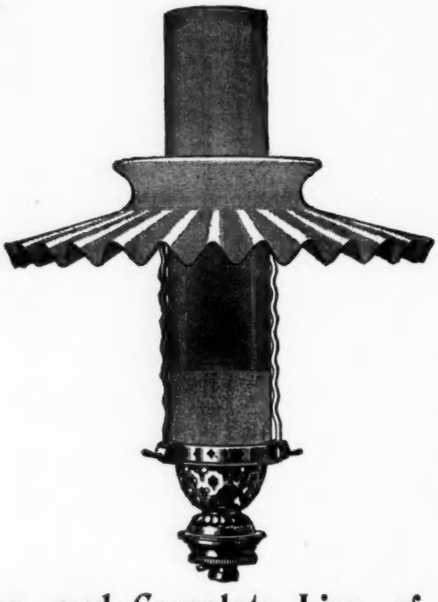

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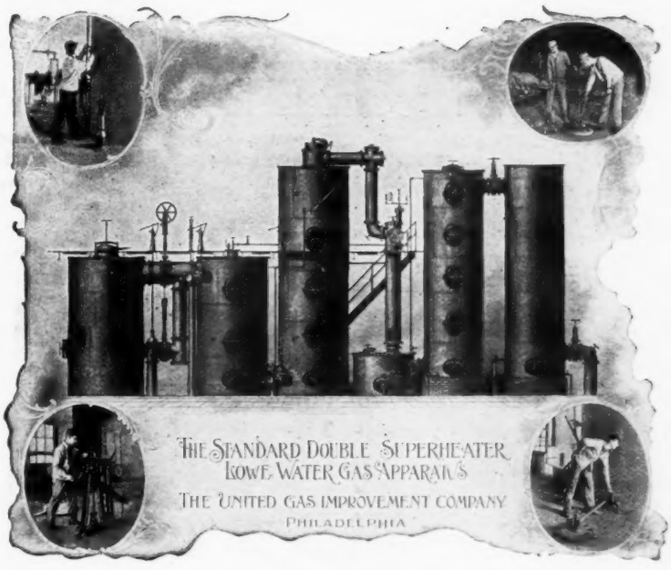
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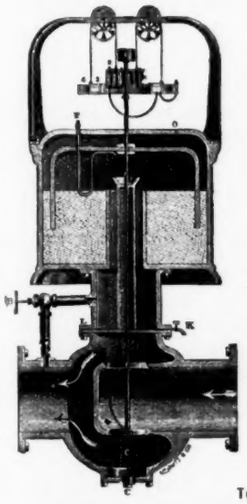

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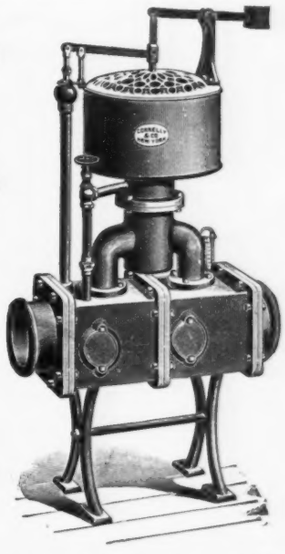

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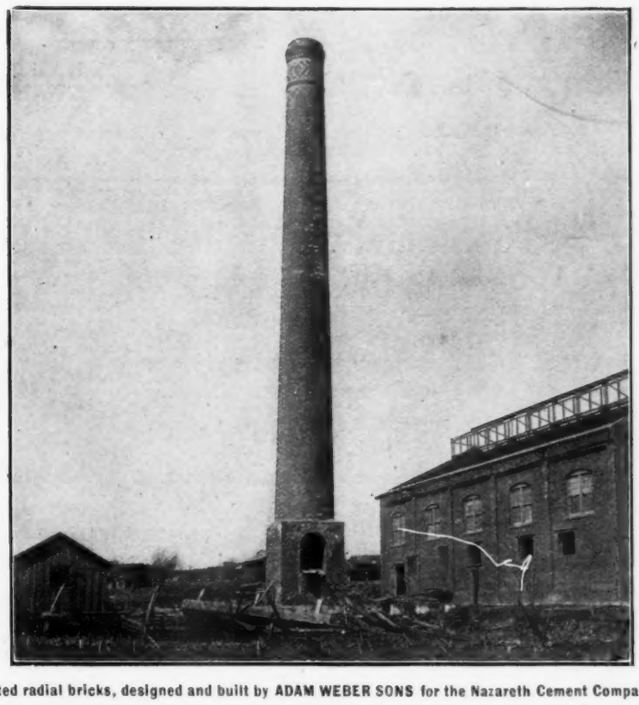

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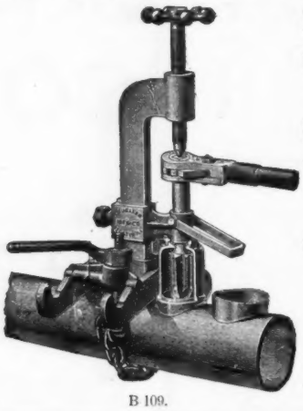

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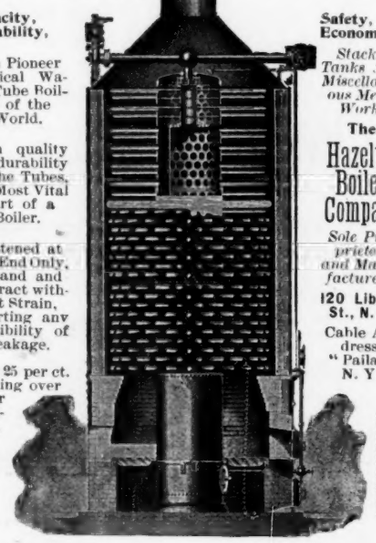

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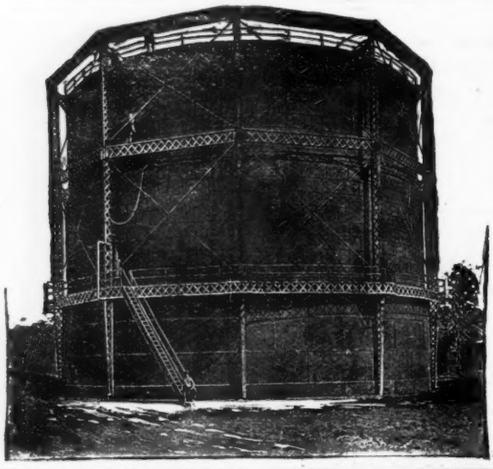

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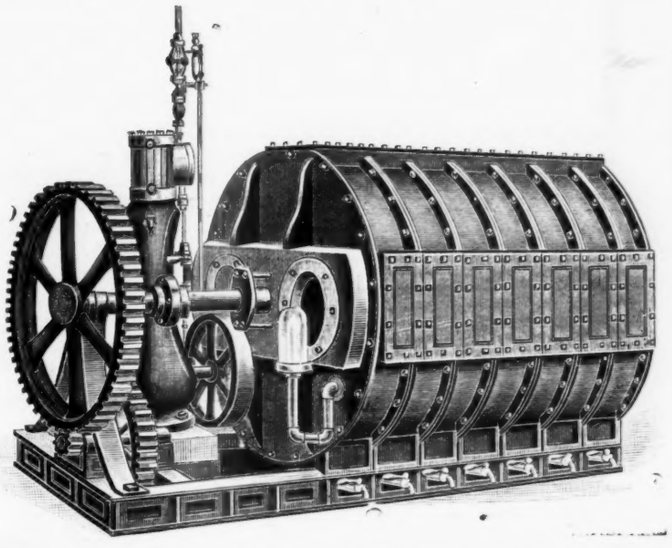

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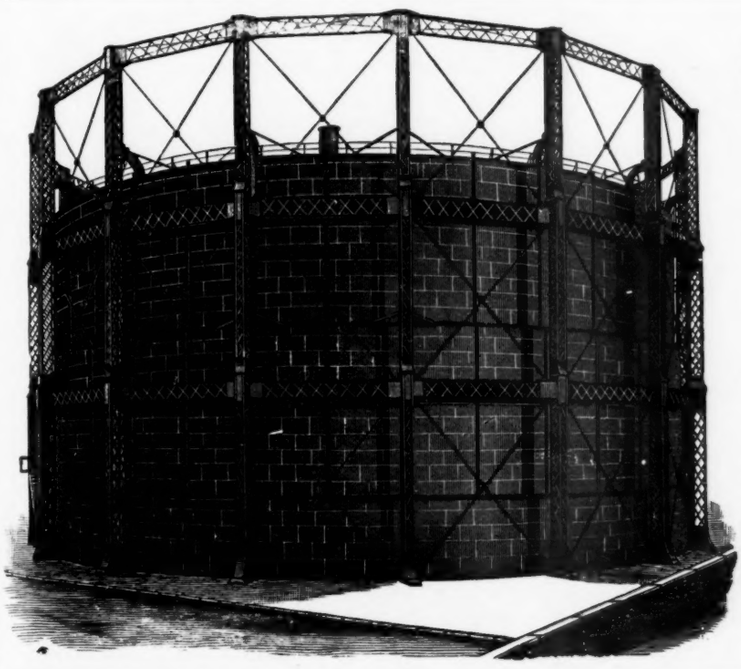

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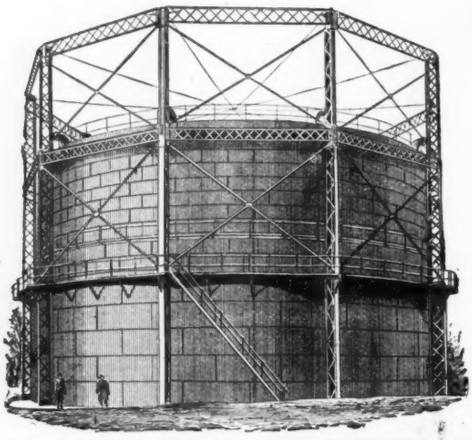

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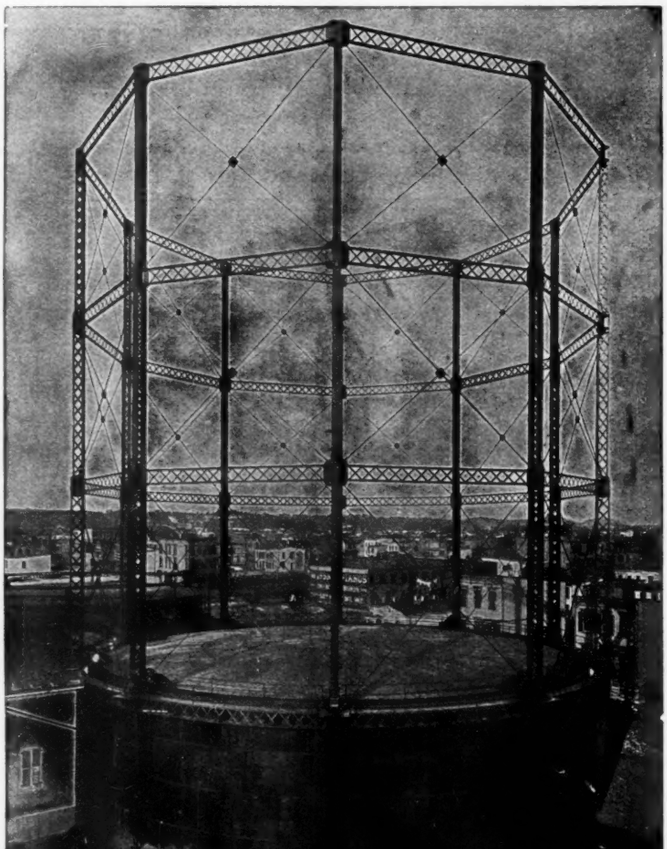

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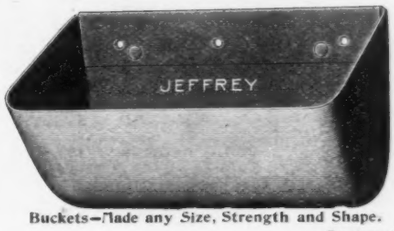

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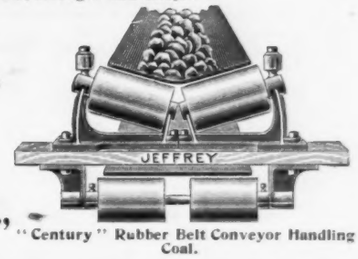

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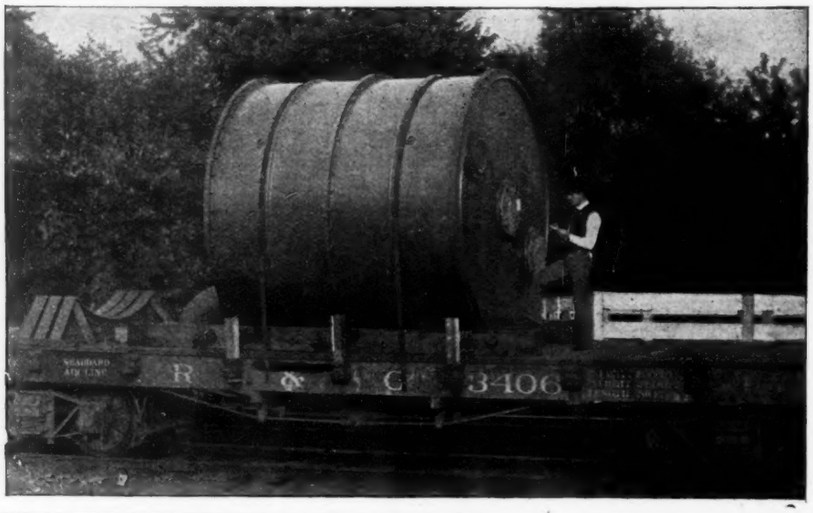

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